

User Guide

hp StorageWorks Advanced Web Tools 4.2.x

First Edition (April 2004)

Part Number: AA-RV2DA-TE

This document provides fabric administrators with the information they need to monitor and modify their HP StorageWorks switch fabrics from a web-based graphical user interface.



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Advanced Web Tools 4.2.x User Guide

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about this guide

This document provides information to assist you in using the web-based graphical user interface to monitor and modify your HP StorageWorks switch fabrics.

This preface discusses the following major topics:

- [Audience](#), page 10
- [Related Documentation](#), page 10
- [Conventions](#), page 11
- [Getting Help](#), page 12

Audience

This book is intended for use by those responsible for monitoring and modifying their HP StorageWorks switch fabric.

Related Documentation

For the latest information, documentation, and firmware releases, visit the HP StorageWorks web site:

<http://www.hp.com/country/us/eng/prodserv/storage.html>.

To access the technical documentation:

1. Locate the **Networked storage** section of the Web page.
2. Under **Networked storage**, go to the **By type** subsection.
3. Click **SAN infrastructure**. The **SAN infrastructure** page opens.
4. Locate the **Fibre Channel Switches** section.
5. Click the appropriate product name. The product overview page opens. Go to the **product information** section.
6. Click **technical documents**.

For information about Fibre Channel standards, visit the Fibre Channel Industry Association web site, located at <http://www.fibrechannel.org>.

Conventions

Conventions consist of typographical elements and text symbols.

Typographical Elements

This document follows the conventions in [Table 1](#).

Table 1: Typography

Convention	Element
Blue text: Figure 1	Cross-reference links
Bold	Menu items, buttons; key, tab, and box names
<i>Italics</i>	Text emphasis and document titles in body text
Monospace font	User input and commands; code, file, and directory names; and system responses (output and messages)
<i>Monospace, italic font</i>	Command-line and code variables
Blue underlined sans serif font text (http://www.hp.com)	Web site addresses

Text Symbols

The following symbols may be found in the text of this guide. They have the following meanings:



WARNING: Text set off in this manner indicates that failure to follow directions in the warning could result in bodily harm or death.



Caution: Text set off in this manner indicates that failure to follow directions could result in damage to equipment or data.

Tip: Text in a tip provides additional help to readers by providing nonessential or optional techniques, procedures, or shortcuts.

Note: Text set off in this manner presents commentary, sidelights, or interesting points of information.

Getting Help

If you have any questions associated with the information in this document, contact an HP authorized service provider or access our web site:
<http://www.hp.com>.

HP Technical Support

Telephone numbers for worldwide technical support are listed on the HP web site:
<http://www.hp.com/support/>. From this web site, select the country of origin.

Note: For continuous quality improvement, calls may be recorded or monitored.

Be sure to have the following information available before calling:

- Technical support registration number (if applicable)
- Product serial numbers
- Product model names and numbers
- Applicable error messages
- Operating system type and revision level
- Detailed, specific questions

HP Storage Web Site

The HP web site has the latest information on this product, as well as the latest drivers. Access storage at: <http://www.hp.com/country/us/eng/prodserv/storage.html>. From this web site, select the appropriate product or solution.

HP Authorized Reseller

For the name of your nearest HP authorized reseller:

- In the United States, call 1-800-345-1518
- In Canada, call 1-800-263-5868
- Elsewhere, refer to the HP web site for locations and telephone numbers:
<http://www.hp.com>.

Introducing Web Tools

1

This chapter discusses the following major topics:

- [Overview](#), page 16
- [Switch Explorer](#), page 16
- [Fabric Tree](#), page 18
- [Fabric Toolbar](#), page 18
- [Switch View](#), page 19
- [Switch View Button Menu](#), page 19
- [Switch Information View](#), page 19
- [Status Legend](#), page 20
- [Launching Web Tools](#), page 20
- [Web Tools and Secure Mode](#), page 20

Overview

Web Tools is a graphical user interface (GUI) that enables administrators to monitor and manage single or small fabrics, switches, and ports from a standard workstation. It is an optionally licensed product that runs on HP StorageWorks Fabric Operating System (OS).

Web Tools provides the administrative control point for Fabric Services, including Advanced Zoning, ISL Trunking, Advanced Performance Monitoring, and Fabric Watch. Web Tools also provides an interface to Telnet commands to perform special switch functions and diagnostics that are available only through the Telnet interface.

Switch Explorer

The first thing you see when you log in to a switch with Web Tools is the Switch Explorer ([Figure 1](#)). The Switch Explorer is divided into several areas that provide access to and information about the fabric. You should familiarize yourself with these areas; the procedures in this guide refer to them as follows:

- **Fabric Tree**, which displays a list of all the switches in the fabric.
- **Fabric Toolbar**, which provides access to fabric-wide management interfaces such as Name Server, and Zoning Administration.
- **Switch View**, which displays an interactive graphical representation of the switch.
- **Switch View Button Menu**, which displays buttons providing switch information such as status, event information, access to Telnet, the Admin module, switch performance, and beaconing.
- **Switch Information View**, which displays information about the switch such as Switch Name, Switch Status, Fabric OS Version, Domain ID, IP address, WWN, and current zone configuration.
- **Status legend**, which defines the meaning of the colors visible in the background of various icons in the Switch Explorer.

[Figure 1](#) is an example of the Web Tools Switch Explorer for an HP StorageWorks SAN Director 2/128.

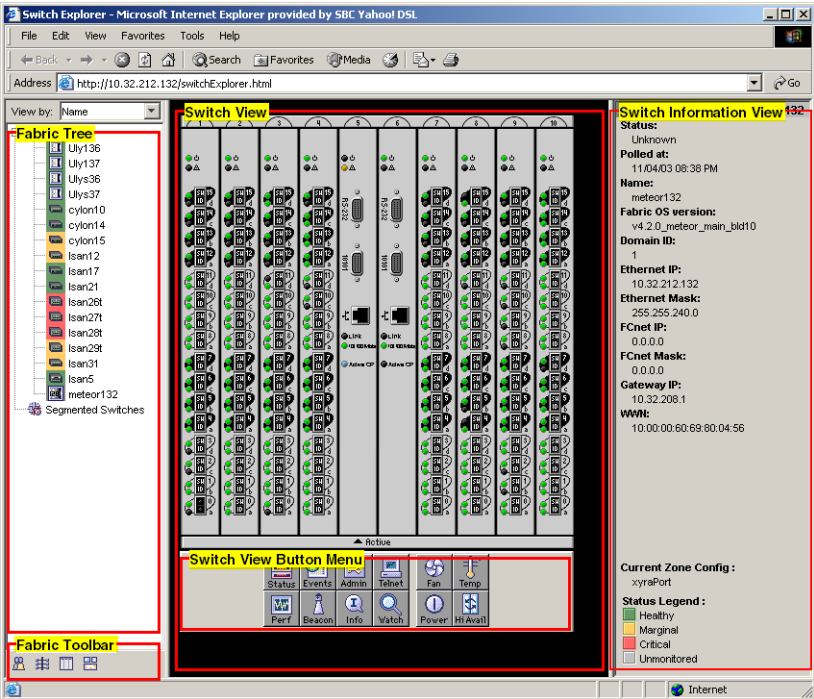


Figure 1: Web Tools Switch Explorer for a SAN Director 2/128

Note: The active Control Processor (CP) in the HP StorageWorks Core Switch 2/64 and SAN Director 2/128 is labeled with a small arrow at the bottom of the CP display. The SAN Director 2/128 active CP is also indicated by the blue Active CP LED indicator.

To add a license for an unlicensed switch, click the corresponding switch icon in Fabric Tree; a license window automatically displays.

Different panels of Web Tools refresh at different rates. [Table 2](#) lists the polling rates for the various panels in Web Tools.

Table 2: Polling Rate in the Switch Explorer Window

Switch Explorer Area	Polling Rate
Name Server	User-defined; 15 seconds minimum
Zone Database	15 seconds
Fabric Watch	15 seconds
Performance Monitor	30 seconds

Fabric Tree

The Fabric Tree is the left window of the Switch Explorer. All switches in the fabric (including segmented switches) are displayed in the Fabric Tree, including switches that do not have a Web Tools license. However, only switches that have a Web Tools license installed can be managed through Web Tools. Other switches must be managed through the Fabric OS Command Line Interface or other management applications.

Use the menu to view switches by Switch Name, IP address, or WWN. The background color displays the current status of the switch.

Note: The Fabric Tree status is updated approximately every 30 seconds. Unreachable switches in the Fabric Tree are polled every two minutes.

Fabric Toolbar

The Fabric Toolbar at the bottom of the Fabric Tree enables you to access fabric-wide administration tasks quickly and easily. The Fabric Toolbar icons provide access to:

- Fabric events
- Topology module
- Name Server information
- Zone Administration module

Switch View

The Switch View displays a graphical representation of the selected switch, including a real-time view of switch and port status. This view is opened by selecting a switch icon on the Fabric Tree.

Note: The Switch View status is updated approximately every 15 seconds. However, the initial display of the Switch Explorer may appear 30 to 60 seconds after the switch is booted.

Switch View Button Menu

The Switch View button menu is also the launch point for the Switch Events screen, Telnet Interface, Fabric Watch module, Switch Administration module, Performance Monitor module, and Port Information view. Some of these functions require a license key to activate. If the appropriate license key is not installed for a feature, that button may be disabled in the display. It also includes buttons that display the status of the switch fans, temperature monitors, switch information, power supply, and beacon.

Switch Information View

The Switch Information view is located beneath or beside the graphic representation of the switch, depending on the switch type. The Switch Information view displays vital switch information such as Switch Name, Switch Status, Fabric OS Version, Domain ID, IP address, WWN, and current zone configuration.

Note: The information in the Switch Information view is polled every 15 seconds.

Status Legend

The Status Legend is included in the Switch Information view and defines the meaning of colors visible in the background of the various icons in the Switch Explorer.

Each color indicates a different operational state:

- Green for healthy
- Yellow for marginal
- Red for critical
- Gray for unknown or unmonitored

Note: For all status displays based on errors per time interval, any error causes the status to show faulty until the entire sample interval has passed.

Launching Web Tools

You can launch Web Tools after the license is installed on the switch and the Java™ Plug-in and Web browser are installed and configured on the client workstation.

To launch Web Tools:

1. Launch the Web browser and type the IP address of the licensed switch in the **Location/Address** field:
`http://123.123.123.123`
2. Press **Enter**. Web Tools launches, displaying the Switch Explorer.

Web Tools and Secure Mode

When Secure Mode is enabled on switches managed through Web Tools, there are certain requirements and scenarios you should be aware of. You should read through these requirements and scenarios if you plan to manage any switches that have secure mode enabled using Web Tools.

Web Tools Access and the HTTP_POLICY

When secure mode is enabled, access to the Web Tools interface is controlled by the HTTP_POLICY. If secure mode is enabled and an HTTP_POLICY has been defined, your workstation IP address must be included in this policy or you will not have access to Web Tools for any switch in the fabric. If your workstation IP address is not included in this policy, the interface disabled page is opened when you attempt to access a switch. For instructions on including your workstation in the HTTP_POLICY, refer to the *HP StorageWorks Secure Fabric OS 4.2.x User Guide*.

Note: If a secure mode change is made in the fabric—that is, secure mode is enabled, secure mode is disabled, or there is a change to the primary FCS—you must exit and relaunch Web Tools. If Web Tools is kept open after a secure mode change occurs, the behavior is undefined.

Opening Modules in a Secure Fabric

When opening modules in a secure fabric, log in to one module at a time, and complete the whole login process before proceeding to any other task. For example, if you want to access both the Zone Administration and the Switch Administration modules, open one of the modules, log in, and wait for it to load completely before opening the second module. Abnormal behavior can occur if you attempt to open two modules simultaneously in a fabric with secure mode enabled.

Certain Web Tools features are limited or disabled, or both, when secure mode is enabled on a fabric. For more information about secure mode, refer to the *HP StorageWorks Secure Fabric OS 4.2.x User Guide*.

Primary-FCS-Only Functionality

The following Web Tools functionality is reserved for the primary FCS when secure mode is enabled:

- Zoning Administration is allowed only from the primary FCS switch when secure mode is enabled. For all other switches in a secure fabric, the **Zoning** button is disabled.
- The SNMP Access Control list is replaced with the RSNMP_Policy and WSNMP_Policy in secure mode.

- SNMP access control lists and the SNMP community strings can be modified only from the Primary FCS switch when secure mode is enabled. For non-FCS switches, you can view the SNMP community strings, but they are read-only, and the SNMP access control lists on the SNMP tab are not displayed.
- The administration password can be changed only from the primary FCS switch when secure mode is enabled.

Note: For the switches to send SNMP traps, you must first enter the CLI command `snmpmibcapset`. This enables the Management Information Bases (MIBs) on all switches to be monitored.

Disabled Functionality

Telnet access to a switch and the **Telnet** button in Web Tools are both disabled when Secure Mode is enabled for a fabric. You must use `sectelnet` or `SSH` to access the Fabric OS CLI in a secure fabric. These capabilities are not accessible from Web Tools. For more information on **sectelnet** or **SSH**, refer to the *HP StorageWorks Secure Fabric OS 4.2.x User Guide*.

Requirements, Installation, and Support

2

This chapter discusses the following major topics:

- [Requirements](#), page 24
- [Installing a Web Tools License](#), page 26
- [Switch Support](#), page 28

Before installing Web Tools on your workstation, verify that your switches and workstation meet the Web Tools requirements.

Requirements

[Table 3](#) specifies the supported operating systems, as well as which browsers and Java Plug-ins can be used on those operating systems.

Table 3: Web Tools Requirements

Operating System	Browser	Java Plug-in
Red Hat Linux 9.0	Mozilla 1.4	1.4.2
Solaris 2.8	Mozilla 1.4	1.4.2
Solaris 2.9	Mozilla 1.4	1.4.2
Windows® 2000	Internet Explorer 6.0	1.3.1_04 1.4.1_02 (recommended)
Windows 2003	Internet Explorer 6.0	1.3.1_04 1.4.1_02 (recommended)
Windows XP	Internet Explorer 6.0	1.3.1_04 1.4.1_02 (recommended)

Note: Some browsers must be configured to work with Web Tools. For information about how to do this, see [“Configuring the Web Browser”](#) on page 24.

Adequate RAM is required on Windows systems:

- 256 MB or more RAM for fabrics of 15 switches or less
- 512 MB or more RAM for fabrics of more than 15 switches

A minimum of 8 MB of video RAM is also recommended.

Configuring the Web Browser

Specific browser settings are required for the correct operation of Web Tools with Internet Explorer.

Configuring Internet Explorer

Correct operation of Web Tools with Internet Explorer requires specifying the appropriate settings for browser refresh frequency and process model. Browser pages should be refreshed frequently to ensure the correct operation of Web Tools.

To set the refresh frequency:

1. Select **Internet Options** from the **Tools** menu.
2. Select the **General** tab and click **Settings** (under **Temporary Internet Files**).
3. Under **Check for newer versions of stored pages**, select **Every visit to the page**.

Installing Java on the Workstation

A Java Plug-in must be installed on the workstation for the correct operation of Web Tools. The required version depends on the operating system. See [Table 3](#) on page 24 for a list of supported browsers on supported operating systems and the JREs they require.

Installing the Java Runtime Environment on Solaris and Linux

To install the JRE on your Solaris or Linux client workstation:

1. Locate the Java Runtime Environment (JRE) on the internet, at the following URL: <http://java.sun.com/>

Note: This URL is subject to change without notice.

2. Follow the instructions to install the JRE.
3. Create a symbolic link from the location:
`$MOZILLA/plugins/libjavaplugin_oji.so`
to the location:
`$JRE/plugin/$ARCH/ns600/libjavaplugin_oji.so`

Installing a Java Patch on Solaris

To install any patches on Solaris:

1. Search for any required patches for your current version of the JRE at the following web site:

<http://java.sun.com/j2se/1.4.2/download.html>

Note: This URL is subject to change without notice.

2. Follow the link to download the patch; exit the browser when done.
3. Install the patch and reboot the system.

Installing the Java Plug-in on Windows

Perform the following steps to determine whether the correct Java Plug-in version is installed and to install Java Plug-ins:

1. Access the **Start Menu > Settings > Control Panel > Java Plug-in version**. The Java Plug-in Control Panel is displayed.
2. Select the **About** tab.
3. Determine whether the correct Java Plug-in version is installed, and install it, if necessary:
 - If the correct version is installed, Web Tools is ready to use.
 - If no Java Plug-in is installed, point the browser towards a switch running Fabric OS V4.x, follow the link to the Sun Microsystems web site, download the correct Java Plug-in, then double-click the downloaded file to install the plug-in.
 - If an outdated version is currently installed, uninstall it, relaunch the browser, enter the address of a switch running Fabric OS V4.0 or later. Web Tools guides you through the steps to download the proper Java Plug-in.

Installing a Web Tools License

A Web Tools license can be installed either through Telnet or over the Web.

To determine whether a license is already installed on a switch, follow the instructions provided in the section “[Installing a Web Tools License Through Telnet](#)” on page 26. If a license is not installed, contact your switch supplier to obtain a license key.

Installing a Web Tools License Through Telnet

To install a Web Tools license through Telnet:

1. Log in to the switch by Telnet (refer to the *HP StorageWorks Fabric OS 4.2.x Procedures User Guide* for more information), using an account that has administrative privileges.

2. To determine whether a Web Tools license is already installed on the switch, type `licenseshow` on the Telnet command line.

A list displays, showing all the licenses currently installed on the switch.

```
switch:admin> licenseshow  
1A1AaAaaaAAAA1a:  
Zoning license
```

If the Web Tools license is not included in the list or is incorrect, continue with [step 3](#).

3. On the command line, type the following:

```
licenseadd key
```

where *key* is the license key. The license key value is case-sensitive, and must be entered exactly as given.

4. Verify that the license was added by issuing the following command:

```
licenseshow
```

If the Web Tools license is listed, the feature is available. If the license is not listed, repeat [step 3](#).

Note: The Java Plug-in must also be installed on the client machine to access Web Tools.

Installing Web Tools License Through the Web

Launching Web Tools from any non-licensed switch automatically displays the license dialog box. If the fabric already contains at least one licensed switch, you can use Web Tools to view and license other switches from the licensed switch.

To install the first license through the Web:

1. Launch the Web browser and type the IP address of the switch in the **Location/Address** field. For example:

```
http://123.123.123.123
```

2. Press **Enter**. If a Web Tools license is already installed on the switch, Web Tools launches. If no license is installed, a license dialog box opens. You must log in as an admin user to gain access to the Licensing screen.

3. If the license dialog box opens, follow the instructions provided.

To Install Additional Licenses Through the Web

To install additional licenses through the Web:

1. Launch the Web browser and type the IP address of the licensed switch in the **Location/Address** field. For example:
`http://123.123.123.123`
2. Press **Enter**. Web Tools opens, displaying the Switch Explorer.
3. Click the icon for the switch you want to add a license to. A licensing window opens.
4. Follow the instructions provided.

Switch Support

Web Tools V4.2.x can be installed on the following switches:

- HP StorageWorks SAN Switch 2/8V
- HP StorageWorks SAN Switch 2/16V
- HP StorageWorks SAN Switch 2/16N FF
- HP StorageWorks SAN Switch 2/32
- HP StorageWorks Core Switch 2/64
- HP StorageWorks SAN Director 2/128

Web Tools is part of the firmware of a switch. When you log in to Web Tools on a switch, you can manage other switches in the fabric that have earlier firmware versions. When accessing these switches you are opening the remote switch's version of Web Tools; the functionality available for those switches may vary.

Example

Your fabric includes a switch with a limited switch license and you launch Web Tools using that switch. If the fabric exceeds the switch limit indicated in the license, Web Tools allows a 45-day grace period during which you can still monitor the switch through Web Tools. However, Web Tools displays periodic warning messages.

These messages warn you that your fabric size exceeds the supported switch configuration limit and tells you how much time you have before Web Tools

will be disabled. After the 45-day grace period, you will no longer be able to launch Web Tools from the switch with the limited switch license, if that switch still exceeds the switch limit.

Managing Your Fabrics, Switches, and Ports

3

This chapter discusses the following major topics:

- [Setting Up E-mail Configuration](#), page 33
- [Displaying the Telnet Window](#), page 33
- [Synchronizing Services on the CP](#), page 33
- [Initiating a CP Failover](#), page 34
- [Configuring IP and Mask Information](#), page 34
- [Configuring Advanced IP and Mask Information](#), page 35
- [Configuring a Syslog IP Address](#), page 35
- [Performing a Firmware Download](#), page 36
- [Setting Trap Levels](#), page 36
- [Configuring SNMP Information](#), page 37
- [Configuring Fabric Parameters](#), page 37
- [Configuring FAN Frame Notification Parameters](#), page 38
- [Enabling Insistent Domain ID Mode](#), page 39
- [Configuring a Static Route](#), page 39
- [Enabling and Disabling Dynamic Load Sharing](#), page 40
- [Enabling and Disabling In-Order Delivery of Frames](#), page 41
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- [Changing the Switch Domain ID](#), page 43
- [Enabling and Disabling a Switch](#), page 43

- [Viewing and Printing a Switch Report](#), page 44
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- [Enabling or Disabling a Port](#), page 47
- [Configuring a Port For Long Distance](#), page 48

Setting Up E-mail Configuration

To set up e-mail configuration:

1. Select the desired switch from the Fabric Tree. The selected switch displays in the Switch View.
2. Click the **Admin** icon from the Switch View. The login dialog box opens.
3. Enter the admin user name and password.
4. Enter a valid IP address for **DNS Server 1**.
5. Optional: Enter a valid IP address for **DNS Server 2**.
6. Enter a **domain name** between 4 and 32 characters.
7. Click **Apply** to save changes.

Displaying the Telnet Window

To access Telnet through Web Tools:

1. Launch Web Tools.
2. Select the desired switch from the Fabric Tree. The Switch View opens.
3. Click the **Telnet** button from the Switch View. The Telnet window opens.
4. Enter a user name and password.
5. Optional: To close the session when you are done, type the `exit` command.

Synchronizing Services on the CP

A nondisruptive CP failover is possible only when all the services on it have been synchronized.

To synchronize the services:

1. Select the desired switch from the Fabric Tree. The selected switch displays in the Switch View.
2. Click the **Hi Avail** icon from the Switch View. The login dialog box opens.
3. Enter the admin user name and password. The HA Administration module opens.
4. Verify that **HA Summary** field displays Non-Disruptive Failover Ready.

If the **HA Summary** field displays **Disruptive Failover Ready**, click the **Synchronize Services** button and wait for the CPs to complete a synchronization of services, so that a nondisruptive failover is ready.

After the **HA Summary** field displays **Non-Disruptive Failover Ready**, a failover can be initiated without disrupting frame traffic on the fabric.

Initiating a CP Failover

To initiate a CP failover:

1. Select the desired switch from the Fabric Tree. The selected switch displays in the Switch View.
2. Click the **Hi Avail** icon from the Switch View. The login dialog box opens.
3. Enter the admin user name and password. The HA Administration module opens.
4. Verify that **HA Summary** field displays **Non-Disruptive Failover Ready** or **Disruptive Failover Ready**. See [“Synchronizing Services on the CP”](#) on page 33 for more information.
5. Click the **Initiate Failover** button. A non-disruptive failover can take a few minutes to complete and you may lose connection to the switch for a few minutes during the failover. Web Tools automatically resumes the connection after the failover.

Configuring IP and Mask Information

To configure the Ethernet, Fibre Channel Net, or Gateway IP address; or the Ethernet; or Fibre Channel Net Mask:

1. Select the desired switch from the Fabric Tree. The selected switch displays in the Switch View.
2. Click the **Admin** icon from the Switch View. The login dialog box opens.
3. Enter the admin user name and password.
4. Select the **Network Config** tab.
5. Enter a new value in the appropriate field (for example, 123.123.123.123).
6. Click **Apply**.
7. Exit and relaunch Web Tools to continue working.

Note: When changing either the Ethernet IP/netmask, Gateway IP, or Fibre channel net IP/net mask from Web Tools, there is a normal loss of network connection to the switch. If the IP properties have changed, you must close all current windows and restart Web Tools with the new IP address.

Configuring Advanced IP and Mask Information

To configure the advanced Ethernet IP and subnet mask:

1. Select the desired switch from the Fabric Tree. The selected switch displays in the Switch View.
2. Click the **Admin** icon from the Switch View. The login dialog box opens.
3. Enter the admin user name and password.
4. Select the **Network Config** tab.
5. Click the **Advanced** button. The Advanced IP Configuration dialog box opens.
6. Enter valid IP addresses for the Ethernet IP and subnet mask for CP0 and CP1.
7. Click **Apply** to save changes.
8. Click **OK** to return to the **Network Config** tab.

Configuring a Syslog IP Address

The syslog IP represents the IP address of the server that is running the syslog process. The syslog daemon reads and forwards system messages to the appropriate log files and users, depending on the system configuration. When one or more IP addresses are configured, the switch forwards all error log entries to the syslog on the specified servers. Up to six servers are supported. Refer to the *HP StorageWorks Fabric OS 4.2.x Procedures User Guide* for more information on configuring the syslog daemon.

To configure the syslog IP address:

1. Select the desired switch from the Fabric Tree. The selected switch displays in the Switch View.
2. Click the **Admin** icon from the Switch View. The login dialog box opens.
3. Enter the admin user name and password.

4. Click the **Network Config** tab.
5. Enter a non-null IP address in one of the **Syslog IP** fields (for example, 123.123.123.123).
6. Click **Add**. The configured IP is displayed in the Syslog IP window.
7. Click **Apply**.

Performing a Firmware Download

To download a new version of the firmware:

1. Select the desired switch from the Fabric Tree. The selected switch displays in the Switch View.
2. Select the **Admin** icon from the Switch View. The login dialog box opens.
3. Enter the admin user name and password.
4. Click the **Upload/Download** tab.
5. Click the **Firmware Download** radio button.
6. Enter the user name, password, and host IP information.
7. Enter the fully qualified path to the firmware file.
8. Click **Apply**.

Setting Trap Levels

To set trap levels:

1. Select the desired switch from the Fabric Tree. The selected switch displays in the Switch View.
2. Click the **Admin** icon from the Switch View. The login dialog box opens.
3. Enter the admin user name and password.
4. Click the **SNMP** tab.
5. Select a trap level from the drop-down menu. The level you select identifies the minimum event level that will prompt a trap.
6. Click **Apply**.

Configuring SNMP Information

To configure SNMP information:

1. Select the desired switch from the Fabric Tree. The selected switch displays in the Switch View.
2. Click the **Admin** icon from the Switch View. The login dialog box opens.
3. Enter the admin user name and password.
4. Click the **SNMP** tab.
5. Enter a contact name, a description, and a location.
6. Optional: Check the **Enable Authentication Trap** box to allow traps to be sent to the reception IP address.
7. Click **Apply**.

Configuring Fabric Parameters

You can configure the following fabric parameters:

- **BB Credit**—Configure the number of buffers that are available to attached devices for frame receipt. The default BB Credit is 16. The range is 1–16.
- **R_A_TOV**—Resource Allocation Time Out Value in milliseconds. This variable works with the E_D_TOV to determine switch actions when presented with an error condition. The default is 10000. The range is 4000–120000.
- **E_D_TOV**—Error Detect Time Out Value in milliseconds. This timer flags a potential error condition when an expected response is not received within the set time. The valid range is 1000 - 5000.
- **Datafield size**—The largest possible data field size in bytes. The valid range is 256 - 2112.
- **Switch PID Format**—Select a switch PID format from one of the following:
 - VC Encoding
 - Format 1 (0-base, 256 encoding)
 - Format 2 (16-base, 256 encoding)
- **Sequence Level Switching**—Select check box to enable frames of the same sequence from a particular group to be transmitted together. When this option is not selected, frames are transmitted interleaved among multiple sequences.

Under normal circumstances, sequence level switching should be disabled for better performance. However, some host adapters have issues when receiving interleaved frames among multiple sequences.

- **Disable Device Probing**—Set this mode only if the switch N_Port discovery process (PLOGI, PRLI, INQUIRY) causes an attached device to fail. When set, devices that do not register with the Name Server are not present in the Name Server database. Set this mode only if the switch N_Port discovery process (PLOGI, PRLI, INQUIRY) causes an attached device to fail.
- **Per-Frame Routing Priority**—Choose to select or deselect Per-Frame Routing Priority. When enabled, the virtual channel ID is used in conjunction with a frame header to form the final virtual channel ID.
- **Suppress Class F Traffic**—Apply only if VC Encoded Address Mode is also set. When checked, translatable addressing (which allows private devices to communicate with public devices) is disabled.
- **Insistent Domain ID Mode**—Set this mode to make the current Domain ID insistent across reboots, power cycles, and failovers.

To configure fabric parameters:

1. Select the desired switch from the Fabric Tree. The selected switch displays in the Switch View.
2. Click the **Admin** icon from the Switch View. The login dialog box opens.
3. Enter the admin user name and password.
4. Disable the switch.
5. Click the **Configure** tab.
6. Click the **Fabric** subtab.
7. Make the desired fabric parameter configuration changes.
8. Click **Apply**.
9. Enable the switch.

Configuring FAN Frame Notification Parameters

To configure FAN frame notification parameters:

1. Select the desired switch from the Fabric Tree. The selected switch displays in the Switch View.
2. Click the **Admin** icon from the Switch View. The login dialog box opens.

3. Enter the admin user name and password.
4. Select the **Switch Information** tab.
5. Disable the switch.
6. Click the **Apply** button.
7. Select the **Configure** tab.
8. Select the **Arbitrated Loop** tab.
9. Check or uncheck the FAN Frame Notification box in the Arbitrated Loop Parameters section.
10. Click **Apply**.
11. Re-enable the switch.

Enabling Insistent Domain ID Mode

To enable insistent domain ID mode:

1. Select the desired switch from the Fabric Tree. The selected switch displays in the Switch View.
2. Click the **Admin** icon from the Switch View. The login dialog box opens.
3. Enter the admin user name and password.
4. Click the **Switch Information** tab.
5. Disable the switch by selecting the **Disable** radio button under **Switch Status**.
6. Click **Apply**.
7. Click the **Configure (Fabric)** tab.
8. Check the **Insistent Domain ID** checkbox.
9. Click **Apply**.
10. Re-enable the switch.

Configuring a Static Route

To configure a static route:

1. Select the desired switch from the Fabric Tree. The selected switch displays in the Switch View.
2. Click the **Admin** icon from the Switch View. The login dialog box opens.

3. Enter the admin user name and password.
4. Click the **Routing** tab.
5. Click **Static Route** in the Navigation Tree. The Static Route window opens.
6. Optional: The slot tabs are displayed for the Core switch 2/64 and SAN Director 2/128. Click a slot number under the static route node in the tree and click **Add**. A new blank line displays in the window.
7. Enter the **In Port** number for the route.
8. Enter the **Destination Domain**. The destination domain IDs match the outputs in the cell.
9. Enter the **Out Port** number for the route.
10. Click **OK** to add the static route.
11. Click **Apply**.

Enabling and Disabling Dynamic Load Sharing

Dynamic Load Sharing (DLS) can be enabled using the **Routing** tab. DLS refers to a dynamic distribution of traffic over available paths. Enabling this feature allows a path to be discovered automatically by the FSPF path selection protocol. For more information regarding DLS, refer to the `dlsset` command in the *HP StorageWorks Fabric OS 4.2.x Command Reference Guide*.

To configure the DLS setting for a fabric:

1. Select the desired switch from the Fabric Tree. The selected switch displays in the Switch View.
2. Click the **Admin** icon from the Switch View. The login dialog box opens.
3. Enter the admin user name and password.
4. Click the **Routing** tab.
5. Click **On** to enable dynamic load sharing or **Off** to disable dynamic load sharing.
6. Click **Apply**.

Enabling and Disabling In-Order Delivery of Frames

In-order delivery (IOD) can be enabled using the **Routing** tab. Enabling IOD guarantees that frames are either delivered in order or dropped. For more information regarding IOD, refer to the `iodset` command in the *HP StorageWorks Fabric OS 4.2.x Command Reference Guide*.

To configure the IOD setting for a fabric:

1. Select the desired switch from the Fabric Tree. The selected switch displays in the Switch View.
2. Click the **Admin** icon from the Switch View. The login dialog box opens.
3. Enter the admin user name and password.
4. Click the **Routing** tab.
5. Select a type of routing from the Navigation Tree.
6. Click **On** to enable in-order delivery or click **Off** to disable in-order delivery.
7. Click **Apply**.

Configuring Link Cost

For information regarding link cost, refer to the `linkcost` command in the *HP StorageWorks Fabric OS 4.2.x Command Reference Guide*.

To configure the link cost for a port:

1. Select the desired switch from the Fabric Tree. The selected switch displays in the Switch View.
2. Click the **Admin** icon from the Switch View. The login dialog box opens.
3. Enter the admin user name and password.
4. Click the **Routing** tab.
5. Click **Link Cost** from the Navigation Tree.

Note: For chassis-based switches, select the slot number before entering the link cost for a port.

6. Click in the **Link** column that corresponds to the appropriate port.

7. Enter the desired link cost. For a 1 Gbit/sec ISL, the default cost is 1000. For a 2 Gbit/sec ISL, the default cost is 500. Valid values for link cost range from 1 to 9999. If you enter a value of 0 and click **Save** and then **Refresh**, the default link value is reset.
8. Click **Apply**.

Configuring a Syslog IP Address

The syslog IP represents the IP address of the server that is running the syslog process. The syslog daemon reads and forwards system messages to the appropriate log files and users, depending on the system configuration. When one or more IP addresses are configured, the switch forwards all error log entries to the syslog on the specified servers. Up to six servers are supported. Refer to the *HP StorageWorks Fabric OS 4.2.x Procedures User Guide* for more information on configuring the syslog daemon.

To configure the syslog IP address:

1. Select the desired switch from the Fabric Tree. The selected switch displays in the Switch View.
2. Click the **Admin** icon from the Switch View. The login dialog box opens.
3. Enter the admin user name and password.
4. Click the **Network Config** tab.
5. Enter a non-null IP address in one of the Syslog IP fields (for example, 123.123.123.123).
6. Click **Add**. The configured IP is displayed in the Syslog IP window.
7. Click **Apply**.

Displaying the Switch Admin Window

To access the Switch Administration window:

1. Select the desired switch from the Fabric Tree. The selected switch displays in the Switch View.
2. Click the **Admin** icon from the Switch View. The login dialog box opens.
3. Enter the admin user name and password.
4. Click the desired tab.

Changing the Switch Name

To change the switch name:

1. Select the desired switch from the Fabric Tree. The selected switch displays in the Switch View.
2. Click the **Admin** icon from the Switch View. The login dialog box opens.
3. Enter the admin user name and password.
4. Click the **Switch Information** tab.
5. Enter a new switch name and click **Apply**.

Changing the Switch Domain ID

To change the switch domain ID:

1. Select the desired switch from the Fabric Tree. The selected switch displays in the Switch View.
2. Click the **Admin** icon from the Switch View. The login dialog box opens.
3. Enter the admin user name and password.
4. Click the **Switch Information** tab.
5. Enter a new domain ID and click **Apply**.

Enabling and Disabling a Switch

To enable or disable a switch:

1. Select the desired switch from the Fabric Tree. The selected switch displays in the Switch View.
2. Click the **Admin** icon from the Switch View. The login dialog box opens.
3. Enter the admin user name and password.
4. Select the **Switch Information** tab, if it is not already selected.
5. Click the (Switch Status) **Enable** radio button to enable the switch or click the (Switch Status) **Disable** radio button to disable the switch.
6. Click the **Apply** button.

Viewing and Printing a Switch Report

To view or print a switch report:

1. Select the desired switch from the Fabric Tree. The selected switch displays in the Switch View.
2. Click the **Admin** icon from the Switch View. The login dialog box opens.
3. Enter the admin user name and password.
4. Click the **View Report** button. A switch report displays in a new window.
5. View or print the report using your browser or the Print Screen option of your computer.

Backing Up a Switch Config File

To back up a firmware configuration file:

1. Select the desired switch from the Fabric Tree. The selected switch displays in the Switch View.
2. Click the **Admin** icon from the Switch View. The login dialog box opens.
3. Enter the admin user name and password.
4. Click the **Upload/Download** tab.
5. Click the **Config Upload to Host** radio button.
6. Enter the user name, password, file name, and host IP information.
7. Click **Apply**.

Performing a Config Download to Switch

To download a configuration to the switch:

1. Select the desired switch from the Fabric Tree. The selected switch displays in the Switch View.
2. Click the **Admin** icon from the Switch View. The login dialog box opens.
3. Enter the admin user name and password.
4. Disable the switch. You can download configurations only to a disabled (offline) switch.
5. Select the **Upload/Download** tab.
6. Click the **Config Download to Switch** radio button.

7. Enter the user name, password, and host IP information.
8. Enter the fully qualified path to the config file.
9. Click **Apply**.
10. Re-enable the switch.

Adding a License to a Switch

To add a license to a switch:

1. Select the desired switch from the Fabric Tree. The selected switch displays in the Switch View.
2. Click the **Admin** icon from the Switch View. The login dialog box opens.
3. Enter the admin user name and password.
4. Click the **License Admin** tab.
5. Enter a new license key in the **New License Key** field.
6. Click **Add**.

Removing a License from a Switch

To remove a license from a switch:

1. Select the desired switch from the Fabric Tree. The selected switch displays in the Switch View.
2. Click the **Admin** icon from the Switch View. The login dialog box opens.
3. Enter the admin user name and password.
4. Click the **License Admin** tab.
5. From the license table, highlight the license you want to remove.
6. Click **Remove**.

Displaying Trunk Group Information

To view information on a trunk group:

1. Select the desired switch from the Fabric Tree. The selected switch displays in the Switch View.
2. Click the **Admin** icon from the Switch View. The login dialog box opens.

3. Enter the admin user name and password.
4. Click the **Trunk Information** tab.

Enabling or Disabling Trunking Mode on a Port

To enable or disable trunking mode on a port:

1. Select the desired switch from the Fabric Tree. The selected switch displays in the Switch View.
2. Click the **Admin** icon from the Switch View. The login dialog box opens.
3. Enter the admin user name and password.
4. Click the **Port Setting** tab.
5. Select the slot number.
6. To enable trunking mode on a port, check the box in the **Enable Trunking** column that corresponds to the port you wish to trunk. To disable trunking mode on a port, uncheck the box.
7. Click **Apply**.

Configuring Port Speed

To configure port speed:

1. Select the desired switch from the Fabric Tree. The selected switch displays in the Switch View.
2. Click the **Admin** icon from the Switch View. The login dialog box opens.
3. Enter the admin user name and password.
4. Click the **Port Setting** tab.
5. Select the desired speed for the corresponding port.
6. Click **Apply**.

Assigning a Name to a Port

To optionally name a port:

1. Select the desired switch from the Fabric Tree. The selected switch displays in the Switch View.

2. Click the **Admin** icon from the Switch View. The login dialog box opens.
3. Enter the admin user name and password.
4. Click the **Port Setting** tab.
5. Click in the **Port Name** column; select the field that corresponds to the port you want to name.
6. Enter a name for the port. Port names can contain up to 32 alphanumeric characters. Although it is not required that port names be unique, it is recommended.
7. Click **Apply**.

Disabling a Port over Reboots

To disable a port so that it remains disabled over reboots:

1. Select the desired switch from the Fabric Tree. The selected switch displays in the Switch View.
2. Click the **Admin** icon from the Switch View. The login dialog box opens.
3. Enter the admin user name and password.
4. Click the **Port Setting** tab.
5. Select the slot and port you want to keep disabled over reboots.
6. Check the **Persistent Disable** checkbox for that port.
7. Click **Apply**.

Enabling or Disabling a Port

If you disable a *principal* ISL port, the fabric reconfigures. If the port was connected to a device, that device is no longer accessible from the fabric.

To enable or disable a port:

1. Select the desired switch from the Fabric Tree. The selected switch displays in the Switch View.
2. Click the **Admin** icon from the Switch View. The login screen opens.
3. Enter the admin user name and password.
4. Click the **Port Setting** tab.

5. Check or uncheck the **Enabled** box that corresponds to the port you want to enable or disable.
6. Click **Apply**.
7. Review the log at the bottom of the tab for information regarding the switch configuration changes.

Configuring a Port For Long Distance

Enabling Virtual Channel Link Translation Mode (VCXLT) allocates enough full-size frame buffers on a port to support a long-distance link up to 100 km. Refer to the `portcfglongdistance` command in the *HP StorageWorks Fabric OS 4.2.x Command Reference Guide* for more information.

The port speed is displayed as follows:

- 1G - 1 Gbit/sec
- 2G - 2 Gbit/sec
- N1 - Negotiated 1 Gbit/sec
- N2 - Negotiated 2 Gbit/sec

To configure a port for long-distance connection:

1. Select the desired switch from the Fabric Tree. The selected switch displays in the Switch View.
2. Click the **Admin** icon from the Switch View. The login dialog box opens.
3. Enter the admin user name and password.
4. Click the **Extended Fabric** tab.
5. Select the desired distance from the **Long-Distance Setting** menu. Depending on the distance selected, this may require an optional license. For information about the various distances, see [Table 4](#), which describes the long-distance settings and identifies the settings that require an extended fabrics license.
6. Check the **VCXLT** box.
7. Click **Apply**.

Table 4: Long Distance Settings and License Requirements

Value	Description	Requires Extended Fabrics License
L0	No long distance setting enabled.	No
LE	Extended Normal setting enabled, less than 10 km or 6 miles.	No
L0.5	Less than 25 km.	Yes
L1	Medium long distance setting enabled, less than 50 km or 31 miles.	Yes
L2	Long distance setting enabled, less than 100 km or 62 miles.	Yes
LD	Dynamic setting.	Yes

Monitoring Your Fabrics, Switches, and Ports

4

This chapter discusses the following major topics:

- [Displaying Fabric Events](#), page 52
- [Displaying a Fabric Topology Report](#), page 52
- [Displaying the Name Server](#), page 52
- [Displaying Detailed Fan Hardware Status and Information](#), page 54
- [Displaying the Temperature Status](#), page 54
- [Displaying the Power Supply Status](#), page 54
- [Displaying the Switch Events Report](#), page 55
- [Checking the Physical Health of a Switch](#), page 56
- [Displaying Detailed Switch Information](#), page 56
- [Displaying Switches in the Fabric](#), page 56
- [Displaying Port and Switch Throughput](#), page 57
- [Physically Locating a Switch Using Beaconing](#), page 57
- [Displaying Fabric Shortest Path First \(FSPF\) Routing](#), page 58
- [Displaying the High Avail Module](#), page 58
- [Displaying Port Information](#), page 58
- [Displaying Swapped Port Area IDs](#), page 59

Displaying Fabric Events

Note: Fabric Events are not automatically polled. You must click **Refresh** from the Fabric Events window to poll fabric events.

To view fabric events:

1. Click the **Fabric Events** button on the Fabric toolbar.
The Fabric Events window opens.
2. Click the column header to sort the events by a particular column.
3. Drag the column divider to resize a column.

Displaying a Fabric Topology Report

To view a fabric topology report:

1. Click the **Fabric Topology** button in the Fabric Toolbar.
The Fabric Topology window opens.
2. Select the top print button to print a topology report of the local domain.
Select the bottom print button to print a topology report of the destination domain.

Displaying the Name Server

Advanced Web Tools displays name server entries listed in the Simple Name Server database. This includes all name server entries for the fabric, not only those related to the local domain. Each row in the table represents a different device.

Note: The polling interval for the Name Server information is every 30 seconds.

[Table 5](#) specifies the entries in the name server table.

Table 5: Name Server Table Entries

Field or Button	Description
Auto Refresh	Check to enable Auto Refresh. Uncheck to disable Auto Refresh.
Auto Refresh Interval	Enter the number of seconds for the refresh interval if Auto Refresh is checked.
Refresh	Select to refresh the window immediately.
OK	Select to close the window.
Domain #	The domain ID of the switch to which the device is connected.
Port #	The number of the switch port to which the device is connected.
Port Name	The name of the port. This option is available only on switches running firmware versions 3.1.x or 4.1.x.
Port ID	The port ID of the device (24-bit hexadecimal value).
Port Type	The port type of the device, where: N = fabric direct attached port NL = fabric direct attached loop port
Fabric Port WWN	The worldwide name of the fabric port.
Device Port WWN	The worldwide name of the device port.
Device Node WWN	Displays the worldwide name of the device node.
Device Name	The symbolic name of the device assigned through the SCSI inquiry command.
FC4 Types	The Fibre Channel FC4 layer types supported by the device, such as IP or FCP.
COS	The Fibre Channel classes of service supported by the device.
Port IP Address	The IP address of the fabric port.
Hard Address	The hard address of the fabric port.
Member of Zones	The zones to which this device belongs. This column does not update when the table is refreshed. To view updated zoning information, close and reopen the Name Server Table.

To view a list of the switches in the Name Server, perform the following steps:

1. Click the **Name Server** icon from the Fabric Toolbar.

The Name Server window opens.

2. Select the column header to sort the name server entries by a particular column. Drag the column divider to resize a column. Drag the column header to reorder columns.
3. Check the **Auto Refresh** checkbox from the Name Server window.
4. Enter an auto refresh interval, with a minimum of 15 seconds.
The Name Server entries refresh at the rate just set.

Displaying Detailed Fan Hardware Status and Information

The background color of the **Fan** button indicates the overall status of the fans.

To display the fan status detail:

1. Select the desired switch from the Fabric Tree. The selected switch displays in the Switch View.
2. Click the **Fan** button from the Switch View. The detailed fan status for the switch is displayed.

Displaying the Temperature Status

To display the temperature status detail:

1. Select the desired switch from the Fabric Tree. The selected switch displays in the Switch View.
2. Click the **Temp** button from the Switch View.

The detailed temperature sensor states for the switch are displayed. For more information regarding switch temperature, refer to the appropriate hardware documentation.

Displaying the Power Supply Status

To display the power supply status detail:

1. Select the desired switch from the Fabric Tree. The selected switch displays in the Switch View.
2. Click the **Power** button from the Switch View. The detailed power supply status for the switch is displayed.

Displaying the Switch Events Report

The **Events** button displays a running log of events for the selected switch. The event log includes sortable fields for switch information, time stamps, severity level, and detailed error messages for root cause analysis. There are six levels of severity messages, ranging from 0 (panic) to 5 (debug). Error message severity levels are explained in [Table 6](#).

Table 6: Error Message Severity Levels

Level	Meaning
0 = Panic	Panic-level messages indicate that a specific software subsystem has detected a fatal or irrecoverable error condition. Examples are memory allocation failures, system call failures, and software detection of misbehaving ASIC or hardware subsystems. Such errors indicate either partial or complete failure of a subsystem. A panic frequently results in a reboot of a single-processor switch or a failover of a SAN Director 2/128 operating in a fully redundant state.
1 = Critical	Critical-level messages indicate serious problems detected by the software that will eventually cause a partial or complete failure of a subsystem. A power supply failure or sensor failure, for example, can cause a critical level error message. Some of the critical errors might overlap in severity with the Panic-level messages.
2 = Error	Error-level messages indicate error conditions that might not be considered fatal. These messages are considered to be less severe than Panic or Critical error messages.
3 = Warning	Warning-level messages are less severe than Error messages. These messages usually indicate temporary failures detected by a software module.
4 = Information	Information-level messages are purely informational, recording important events in the system; for example, disabling a port or clearing the switch error log.
5 = Debug	Debug-level messages are for debugging purposes. Debug-level messages are produced by code inserted by the vendor to inform the user that a suspected problem has occurred.

For more information, refer to the *HP StorageWorks Diagnostics and System Error Messages 4.2.x Reference Manual*.

To view the log of switch events:

1. Select the desired switch from the Fabric Tree. The Switch View opens.
2. Click the **Switch Events** button from the Switch View. A Switch Events Report displays.
3. View the switch events and messages.

Checking the Physical Health of a Switch

To check the physical health of a switch:

1. View the background color (which shows the status) of the desired switch in the Fabric Tree.

For additional switch status information, continue to the next step.

2. Select the desired switch from the Fabric Tree. The Switch View opens for that switch.
3. View the background color of the **Status** button.
4. Click the **Status** button to see a written description of the health status.

Displaying Detailed Switch Information

To display detailed switch information:

1. Select the desired switch from the Fabric Tree. The selected switch displays in the Switch View.
2. Click the **Info** button. The Switch Information window opens.

Displaying Switches in the Fabric

To access the Switch Explorer for a particular switch:

1. Launch Web Tools. The Switch Explorer is displayed for the switch you logged in to.
2. Click the + sign in the Navigation Tree to view all the switches in the fabric.
3. Click the desired switch in the Fabric Tree. The graphic of the selected switch is displayed in the Switch View. Additional switch information is displayed in the Switch Information View.

View or click the **Status** button to display the switch's operational state. The background color of the button displays the real-time status of the switch. The status legend interprets the background colors.

If no data is available from a switch, the most recent background color remains displayed.

For all statuses that are based on errors per time interval, any errors cause the status to show faulty until the entire sample interval has passed.

If the switch status is marginal or critical, information on the trigger that caused that status is displayed in the Switch Information view.

Displaying Port and Switch Throughput

Use the Performance Monitor (**Perf**) button to graphically display throughput (in megabytes per second) for each port and for the entire switch.

Physically Locating a Switch Using Beacons

Use the Beacon feature to physically locate a switch in a fabric. The beaconing function helps to physically locate a switch by sending a signal to the specified switch, resulting in an LED light pattern running back and forth across the switch.

To enable beaconing, so that you can find the physical switch within your lab:

1. Select the desired switch from the Fabric Tree. The selected switch displays in the Switch View.
2. Click the **Beacon** button on the Switch View. The LED on the physical switch (selected in the GUI) lights up in a pattern running back and forth across the switch. The beaconing is not shown in the GUI.
3. Observe the physical switches in your installation location to identify the beacons switch.

Displaying Fabric Shortest Path First (FSPF) Routing

To view FSPF routing:

1. Select the desired switch from the Fabric Tree. The selected switch displays in the Switch View.
2. Click the **Admin** icon from the Switch View. The login dialog box opens.
3. Enter the admin user name and password.
4. Click the **Routing** tab.
5. Click the **FSPF** in the Navigation Tree. For bladed switches, click on a slot under **FSPF**. The FSFP window opens.
6. View **Hops and Metrics**.

Displaying the High Avail Module

The High Avail module displays information about the status of the High Availability (HA) feature on the Core Switch 2/64 and SAN Director 2/128 and each CP. It also enables you to perform tasks such as HA Failover or to synchronize services on the CPs.

To access the High Avail module:

1. Select the desired switch from the Fabric Tree. The selected switch displays in the Switch View.
2. Click the **Hi Avail** icon from the Switch View. The login dialog box opens.
3. Enter the admin user name and password. The HA Administration module opens.

Displaying Port Information

The Port Information screen displays statistics and status for the selected port, SFP, or loop. Access information about a port by clicking any of the ports in the Switch View.

The number of slots displayed in the Port Information screen depends on the switch the port is on. For example, the ports on the SAN Director 2/128 have eight slots available; therefore, you should see eight slots in the Port Information screen for a SAN Director 2/128 port. Only physically inserted and powered-on slots are displayed in the Port Information screen.

The port graphics are numbered and have blinking LEDs. For LED status information, refer to the hardware documentation for the switch you are viewing.

To access the Port Information screen:

1. Select the desired switch from the Fabric Tree. The selected switch displays in the Switch View.
2. Click in the Switch View from which you want to access port information. The port graphics display at the top of the Switch View.
3. Click the port icon for which you want to view information. The Port Information screen opens.
4. Click the desired information tab.
5. Click the numbered tabs to view additional information.

Displaying Swapped Port Area IDs

Use this procedure to view swapped ports on the switch. You cannot swap ports using Web Tools; you can view ports that have been swapped using the Fabric OS CLI.

To determine whether a port area ID has been swapped with another switch port:

1. Select the desired switch from the Fabric Tree. The selected switch displays in the Switch View.
2. Click the **Admin** icon from the Switch View. The login dialog box opens.
3. Enter the admin user name and password.
4. Select the **Port Setting** tab.
5. View the **Port** (Area ID) column in the **Port Settings** tab. For ports that have been swapped, the port number is followed by the area ID, in parenthesis.

Performance Monitoring Administration

5

This chapter discusses the following major topics:

- [Overview](#), page 62
- [Predefined Performance Graphs](#), page 63
- [User-Defined Graphs](#), page 66
- [Displaying the Performance Monitor Module](#), page 67
- [Creating a Basic Performance Monitoring Graph](#), page 68
- [Creating an Advanced Performance Monitoring Graph](#), page 68
- [Creating a Snapshot of Port Errors](#), page 69
- [Adding a Graph to a Canvas](#), page 69
- [Modifying an Existing Graph](#), page 70
- [Printing Graphs](#), page 70

Overview

The Performance Monitor graphically displays throughput (in megabytes per second) for each port and for the entire switch.

Using Advanced Performance Monitoring, you can track the following:

- Number of CRC errors for AL_PA devices
- Number of words received and transmitted in Fibre Channel frames with a defined SID/DID pair
- Number of frames with CRC errors received at the port with a defined SID/DID pair
- Number of times a particular filter pattern in a frame is transmitted by a port

Advanced Web Tools provide access to three types of performance monitoring:

- AL_PA monitoring
- End-to-end monitoring
- Filter-based monitoring

For detailed information about the three types of performance monitoring, refer to the *HP StorageWorks Features 4.2.x User Guide*.

The basic mode Performance Monitor is standard in the Web Tools software. The Advanced Monitoring menu in Performance Monitor is optionally licensed software.

Note: Polling intervals within the Performance Monitor dialog are every 30 seconds.

Use Advanced Web Tools to view, customize, or monitor performance by:

- Viewing predefined reports for AL_PA, end-to-end, and filter-based performance monitoring.
- Creating user-definable reports.
- Viewing performance canvas for application-level or fabric-level views.
- Accessing the configuration editor (to save, copy, edit, and remove multiple configurations).
- Saving persistent graphs across reboots (saves parameter data across reboots).

Predefined Performance Graphs

Advanced Web Tools provides graphs to simplify performance monitoring. A wide range of end-to-end fabric, LUN, device, and port metrics graphs are included. [Table 7](#) and [Table 8](#) list the performance graphs available. You can access the basic monitoring graphs on switches that do not have an Advanced Performance Monitoring license activated. The advanced monitoring graphs give more detailed performance information to help you manage your fabric.

Table 7: Predefined Basic Monitoring Performance Graphs

Basic Monitoring Graphs	Description
Port Throughput	Displays the performance of a port in bytes per second for frames received and transmitted.
Switch Aggregate Throughput	Displays the aggregate performance of all ports on a switch.
Blade Aggregate Throughput	Displays the aggregate performance of all ports on a blade.
Switch Throughput Utilization	Displays the port throughput at the time the sample is taken.
Port Error	Displays a line of CRC errors for a given port.
Switch Percent Utilization	Displays the percentage of usage of a chosen switch at the time the sample is taken.
Port Snapshot Error	Displays the CRC error count between sampling periods for all the ports on a switch.

Table 8: Predefined Advanced Monitoring Performance Graphs

Advanced Monitoring Graphs	Description
SID/DID Performance	Displays the traffic between SID and DID pair on the switch being managed.
SCSI vs. IP Traffic	Displays percentage of SCSI versus IP frame traffic on each individual port.
AL_PA Errors	Displays CRC errors for a given port and a given AL_PA.
SCSI Commands by port and LUN (R, W, R/W)	Displays the total number of read/write commands on a given port and read/write commands to a specific LUN.

[Figure 2](#) shows how to access the list of Advanced Performance Monitoring graphs using Advanced Web Tools.

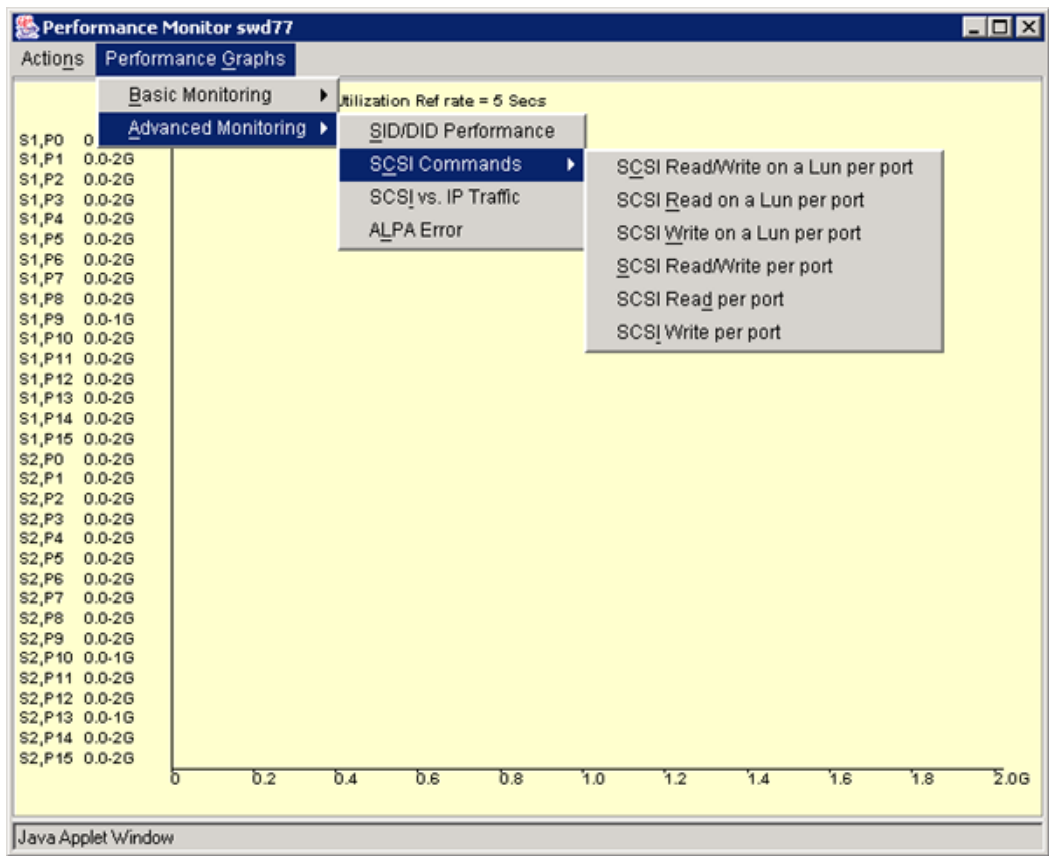


Figure 2: Accessing Performance Graphs

User-Defined Graphs

You can modify the predefined graphs based on parameter fields such as SID/DID, LUN, AL_PA, and port to create your own customized graphs. These user-defined graphs can be added and saved to canvas configurations.

Using Advanced Web Tools, Advanced Performance Monitoring allows you to set up a canvas of performance graphs. The canvas can hold up to eight graphs per window, as shown in [Figure 3](#). Multiple canvases can be set up for different users or different scenarios.

Up to 20 individual canvases, each with up to eight graphs, can be saved. Each canvas is saved with a name and an optional brief description.

In addition to the graphs, the Performance Monitoring Resource Usage Display shows which filter slots have been used for each port, and which are available. A color-coded interface facilitates troubleshooting (see [Figure 4](#)).

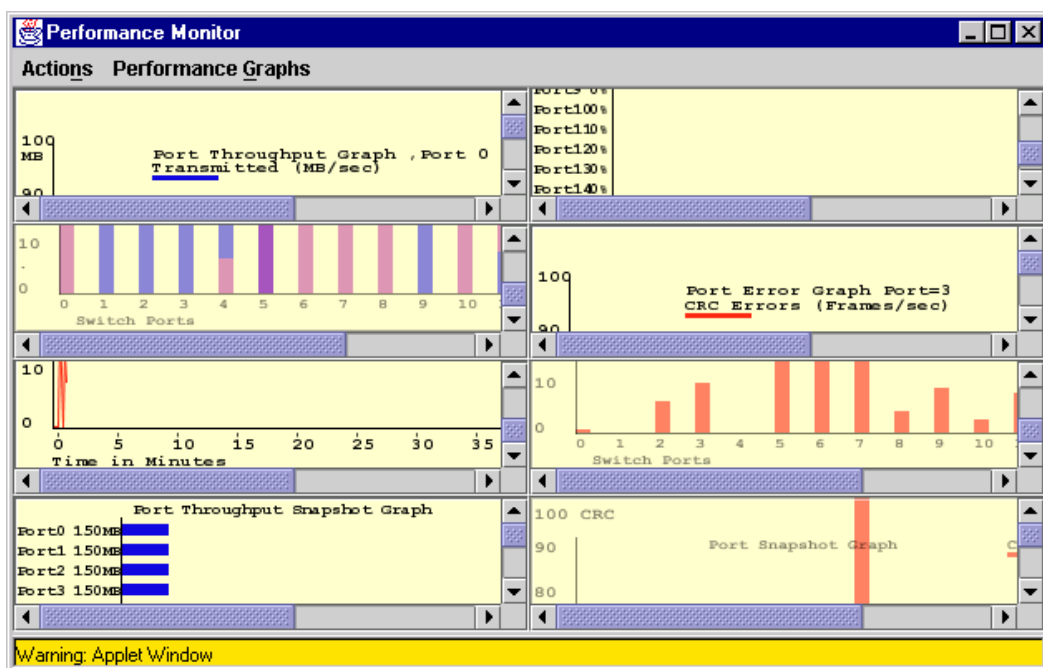


Figure 3: Canvas of Eight Performance Monitoring Graphs

Resource Usage Display						
Switch name: san95						
SLOT,PORT	EE0	EE1	EE2	EE3	EE4	EE
Slot7,Port0	Free	Free	Free	Free	Free	Free
Slot7,Port1	Free	Free	Free	Free	Free	Free
Slot7,Port2	Free	Free	Free	Free	Free	Free
Slot7,Port3	TELN: InUse	Free	Free	TELN: InUse	Free	Free
Slot7,Port4	TELN: InUse	Free	Free	TELN: InUse	Free	Free
Slot7,Port5	TELN: InUse	Free	Free	TELN: InUse	Free	Free
Slot7,Port6	TELN: InUse	Free	Free	TELN: InUse	Free	Free
Slot7,Port7	Free	Free	Free	Free	Free	Free
Slot7,Port8	Free	Free	Free	Free	Free	Free
Slot7,Port9	Free	Free	Free	Free	Free	Free
Slot7,Port10	Free	Free	Free	Free	Free	Free
Slot7,Port11	Free	Free	Free	Free	Free	Free
Slot7,Port12	Free	Free	Free	Free	Free	Free
Slot7,Port13	Free	Free	Free	Free	Free	Free
Slot7,Port14	Free	Free	Free	Free	Free	Free
Slot7,Port15	Free	Free	Free	Free	Free	Free
Slot9,Port0	Free	Free	Free	Free	Free	Free
Slot9,Port1	Free	Free	Free	Free	Free	Free
Slot9,Port2	Free	Free	Free	Free	Free	Free
Slot9,Port3	Free	Free	Free	Free	Free	Free
Slot9,Port4	Free	Free	Free	Free	Free	Free
Refresh Cancel						
Warning: Applet Window						

Figure 4: Performance Monitor Usage Display

Displaying the Performance Monitor Module

To access the Performance Monitor module:

1. Launch Web Tools, displaying the Switch Explorer.
2. Select the desired switch from the Fabric Tree. The Switch View of that switch opens.
3. Click the **Perf** icon from the Switch View. The Performance Monitor module opens.

Creating a Basic Performance Monitoring Graph

To create a basic performance monitoring graph:

1. Select the desired switch from the Fabric Tree. The selected switch displays in the Switch View.
2. Click the **Perf** icon from the Switch View. The Performance Monitor module opens.
3. Select **Performance Graphs > Basic Monitoring > Graph Type**.

Depending on the type of graph you select, you may be prompted to select a port or slot to create a graph for. Enter the information and click **OK**.

The graph is displayed in the Performance Monitor module.

Creating an Advanced Performance Monitoring Graph

Note: You must have an Advanced Performance Monitor license installed to use the advance performance monitor features.

To create an advanced performance monitoring graph:

1. Select the desired switch from the Fabric Tree. The selected switch displays in the Switch View.
2. Click the **Perf** icon from the Switch View. The Performance Monitor module opens.
3. Select **Performance Graphs > Advanced Monitoring > Graph Type**.

Depending on the type of graph you select, you may be prompted to select a port or slot to create a graph for. Enter the information and click **OK**. The graph is displayed in the Performance Monitor module.

Creating a Snapshot of Port Errors

To create a snapshot of port errors:

1. Select the desired switch from the Fabric Tree. The selected switch displays in the Switch View.
2. Click the **Perf** icon from the Switch View. The Performance Monitor module opens.
3. Select **Performance Graphs > Basic Monitoring > Port Snapshot Errors**. The Port Snapshot Errors graph is displayed on the canvas.
4. Select **Actions > Save Current Canvas Configuration** to save the graphs on the canvas.

Adding a Graph to a Canvas

To add a graph to a canvas:

1. Select the desired switch from the Fabric Tree. The selected switch displays in the Switch View.
2. Click the **Perf** icon from the Switch View. The Performance Monitor module opens.
3. Select **Actions > Display Canvas Configurations**. The Canvas Configuration List opens. The message `No Canvas configuration to display` is displayed if there are no saved canvas configurations.
4. Click the desired canvas in the list.
5. Click **Edit**. The Edit Canvas dialog box opens.
6. Click **Add**. A list of graphs displays; you may click a graph to add it to the canvas.

Modifying an Existing Graph

To modify an existing graph:

1. Select the desired switch from the Fabric Tree. The selected switch displays in the Switch View.
2. Click the **Perf** icon from the Switch View. The Performance Monitor module opens.
3. Select **Actions > Display Canvas Configurations**.
The Canvas Configuration List opens.
4. Select the desired canvas from the list and click **Edit**. The Edit Graph dialog box opens.
5. Select the desired graph from the list and click **Edit**.

Note: The Edit button is enabled only for the graphs that are configurable or editable.

6. Click **Cancel** to close the Canvas Configuration List.

Printing Graphs

To print graphs:

1. Select the desired switch from the Fabric Tree. The selected switch displays in the Switch View.
2. Click the **Perf** icon from the Switch View. The Performance Monitor module opens.
3. Select **Actions > Display Canvas Configurations**. The Canvas Configuration List opens.
4. Select the desired graph from the list and click **Load Canvas**. The graph displays on the canvas.
5. Repeat the following step to add more graphs to the canvas. You can add up to eight graphs.
6. Select **Actions > Print All Graphs**. The Print dialog box opens.

Note: Select **Actions > Print All Graphs** to print all the graphs displayed on the selected canvas configuration. Only one canvas configuration can be opened at a time. Each Canvas Configuration can have a total of eight graphs.

7. Click **OK**.

Fabric Watch Administration

6

This chapter discussed the following major topics:

- [Overview](#), page 74
- [Displaying the Fabric Watch Module](#), page 75
- [Configuring Boundary and Alarm Settings](#), page 75
- [Configuring E-mail Server on a Switch](#), page 76
- [Configuring E-mail Alert Recipient](#), page 77
- [Enabling or Disabling Threshold Alarms](#), page 77
- [Configuring Threshold Behavior](#), page 78
- [Displaying an Alarm Configuration Report](#), page 79
- [Displaying Alarms](#), page 80

Overview

The Fabric Watch feature monitors the performance and status of switches and can alert SAN administrators when problems arise, before they become costly failures.

Note: The **Watch** icon displays in the Switch View only when a Fabric Watch license is installed on the switch.

SAN administrators can configure Fabric Watch software to monitor any of the following:

- Fabric events, such as topology reconfigurations and zone changes
- Physical switch conditions, such as fan speeds, power supply status, and chassis temperature
- Port behavior and availability, such as state changes, errors, and performance
- Small form factor pluggables (SFPs)
- Security events (violations and attempted violations)
- Performance

Fabric Watch includes default threshold values that you cannot change. Instead, you can configure custom values and then configure Fabric Watch to use them.

If you do not configure Fabric Watch to run current values, however, your settings will not apply.

Fabric Watch lets you monitor:

- Whether a value changes
- Whether a value exceeds a limit
- Whether a value exceeds an acceptable range

To use the Fabric Watch feature, you must:

- Have a Fabric Watch license installed on your switch
- Access Fabric Watch
- Choose elements that you want to monitor
- Place limits on the acceptable values of those elements and enable the custom limits (configure threshold boundaries)

Note: This procedure applies only to value changes or values exceeding limits.

- Choose whether and how Fabric Watch alerts you to errant values and enable your choices (configure alarms)
- Choose whether and how frequently Fabric Watch identifies unacceptable values (configure threshold traits)

For more detailed information regarding Fabric Watch, refer to the *HP StorageWorks Fabric Watch 4.2.x User Guide*.

Displaying the Fabric Watch Module

To access the **Fabric Watch** module:

1. Launch Web Tools, displaying the Switch Explorer.
2. Select the desired switch from the Fabric Tree. The Switch View of that switch opens.
3. Click the **Watch** icon from the Switch View. The login screen opens.

Note: The **Watch** icon displays in the Switch View only if the Fabric Watch license has been activated.

4. Enter the admin user name and password. The Fabric Watch module opens.

Configuring Boundary and Alarm Settings

To configure threshold boundaries and alarms:

1. Launch Web Tools, displaying the Switch Explorer.
2. Select the desired switch from the Fabric Tree. The Switch View of that switch opens.
3. Click the **Watch** icon from the Switch View. The login screen opens.

Note: The **Watch** icon displays in the Switch View only if the Fabric Watch license has been activated.

4. Enter the admin user name and password.
The Fabric Watch module opens.
5. In the Fabric Watch Navigation Tree, click the class that you want configure.
6. Click the **Threshold Configuration** tab.
7. Click the **Area Configuration** subtab.
8. Select the area that you want to configure from the **Select Area** pulldown menu.
9. Optional: Define custom values by entering values in the trait fields (Unit, High, Low, and Buffer Size) in the Boundary settings.
10. Select **Default** or **Custom** for the Boundary Level. **Default** activates the default setting as threshold configuration. **Custom** activates the custom defined settings as threshold configuration.
11. Check the events that you want to trigger an alarm for from the **Alarm Notification Mechanisms** (Default Mechanisms in Parentheses) area.
12. Click an event.
13. Select alarms to notify you when the event occurs.
14. Check the checkbox of each alarm that you want to associate with the events that you checked.
15. Select **Custom** from the **Select Alarm Level** menu in the **Alarm Setting** area.
16. Click **Save Configuration to Switch** to save the setting persistently.
17. Click **Apply**.

Configuring E-mail Server on a Switch

To set up the e-mail notification recipient's DNS server and domain name:

1. Select the desired switch from the Fabric Tree.
The selected switch displays in the Switch View.
2. Click the **Admin** icon from the Switch View. The login screen opens.
3. Enter the admin user name and password. The Switch Administration module opens.
4. Click the **Switch Information** tab.

5. Enter your primary domain name server IP address in the **DNS Server 1** field in the **Email Configuration** area.
6. Enter your secondary domain name server IP address in the **DNS Server 2** field.
7. Enter the domain name in the **Domain Name** field.

Configuring E-mail Alert Recipient

A different configuration can be set for each class. For example, one e-mail notification can be set for SFPs and another for E_Ports.

To configure the E-mail Alert alarm:

1. Launch Web Tools, displaying the Switch Explorer.
2. Select the desired switch from the Fabric Tree. The Switch View of that switch opens.
3. Click the **Watch** icon from the Switch View. The login screen opens.

Note: The **Watch** icon displays in the Switch View only if the Fabric Watch license has been activated.

4. Enter the admin user name and password. The Fabric Watch module opens.
5. In the Fabric Watch Navigation Tree, click the class that you want configure.
6. Click the **Email Configuration** tab.
7. Enter the e-mail address of the administrator who receives e-mail alerts in the **Mail To:** field.
8. Select **Enabled** in the **Mail Status** area, then click **Apply**.

Enabling or Disabling Threshold Alarms

To enable or disable threshold alarms:

1. Launch Web Tools, displaying the Switch Explorer.
2. Select the desired switch from the Fabric Tree. The Switch View of that switch opens.
3. Click the **Watch** icon from the Switch View. The login screen opens.

Note: The **Watch** icon displays in the Switch View only if the Fabric Watch license has been activated.

4. Enter the admin user name and password. The Fabric Watch module opens.
5. In the Fabric Watch Navigation Tree, click the class with the alarms that you want to enable or disable.
6. Click the **Threshold Configuration** tab.
7. Select the area with the alarms that you want to enable or disable from the **Select Area** menu.
8. Click the **Element Configuration** subtab.
9. Select the element that you want to enable or disable threshold alarms on from the **Select Element** drop-down menu.
10. Click **Enabled** or **Disabled** in the **Status** area.
11. Click **Apply**. Web Tools enables or disables the threshold alarms on the element.

Configuring Threshold Behavior

To configure threshold behavior:

1. Launch Web Tools, displaying the Switch Explorer.
2. Select the desired switch from the Fabric Tree. The Switch View of that switch opens.
3. Click the **Watch** icon from the Switch View. The login screen opens.

Note: The **Watch** icon displays in the Switch View only if the Fabric Watch license has been activated.

4. Enter the admin user name and password. The Fabric Watch module opens.
5. Click the class that you want to configure to a different behavior in the Fabric Watch Navigation Tree.

Note: You can set alarms for information on a switch only if that information is monitored by Fabric Watch for that switch; not all alarm options are available for all switches. For more information, refer to the *HP StorageWorks Fabric Watch 4.2.x User Guide*.

6. Click the **Threshold Configuration** tab.
7. Select the area that you want to configure to a different behavior from the **Select Area** menu.
8. Click the **Element Configuration** subtab.
9. Select the element that you want to configure to a different behavior from the **Select Element** menu.
10. Click **Triggered** to configure triggered behavior or click **Continuous** to configure continuous behavior.

Note: If you click the **Continuous** radio button, enter a time interval in the **Time Interval** menu, or select an interval from the menu.

11. Click **Apply**.

Displaying an Alarm Configuration Report

To view an alarm configuration report:

1. Launch Web Tools, displaying the Switch Explorer.
2. Select the desired switch from the Fabric Tree. The Switch View of that switch opens.
3. Click the **Watch** icon from the Switch View. The login screen opens.

Note: The **Watch** icon displays in the Switch View only if the Fabric Watch license has been activated.

4. Enter the admin user name and password. The Fabric Watch module opens.
5. Click the **Threshold Configuration** tab.

6. Click the **Configuration Report** subtab.
7. Select a previously configured element from the Navigation Tree (see “[Configuring Boundary and Alarm Settings](#)” on page 75).
8. Select the alarm area report to be viewed from the **Area** drop-down menu.
9. Click the **Configuration Report** subtab.

Displaying Alarms

To view alarms:

1. Launch Web Tools, displaying the Switch Explorer.
2. Select the desired switch from the Fabric Tree. The Switch View of that switch opens.
3. Click the **Watch** icon from the Switch View. The login screen opens.

Note: The **Watch** icon displays in the Switch View only if the Fabric Watch license has been activated.

4. Enter the admin user name and password. The Fabric Watch module opens.
5. In the Fabric Watch Navigation Tree, click the class that you want to check for alarms.
6. Click the **Alarm Notification** tab.
7. Select the area that you want to check for alarms from the **Select Area** menu. All alarms for that area appear.

For troubleshooting responses to alarms, refer to the *HP StorageWorks Fabric Watch 4.2.x User Guide* for your firmware.

Zone Administration

7

This chapter discusses the following major topics:

- [Overview](#), page 83
- [Displaying the Zone Administration Module](#), page 84
- [Displaying the Enabled Zone Configuration](#), page 84
- [Displaying the Zone Configuration Summary](#), page 84
- [Adding a World Wide Name \(WWN\) in the Zoning Database](#), page 85
- [Deleting a WWN in the Zone Database](#), page 86
- [Replacing a WWN in the Zone Database](#), page 86
- [Searching for a Zone Member](#), page 87
- [Selecting a Zoning Method](#), page 87
- [Refreshing the Zone Database](#), page 88
- [Refreshing the Fabric](#), page 89
- [Enabling a Zone Configuration](#), page 89
- [Disabling a Zoning Configuration](#), page 90
- [Saving Changes to an Existing Configuration](#), page 91
- [Clearing the Zone Database](#), page 91
- [Creating a Zone Alias](#), page 92
- [Modifying the Members of a Zone Alias](#), page 93
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- [Modifying the Members of a Zone](#), page 96
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- [Creating a Fabric Assist Zone](#), page 98
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- [Adding and Removing Fabric Assist Zone Members](#), page 99
- [Deleting a Fabric Assist Zone](#), page 99
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- [Creating a Zone Configuration](#), page 100
- [Adding or Removing Zone Configuration Members](#), page 102
- [Deleting a Zone Configuration](#), page 103
- [Renaming a Zone Configuration](#), page 104
- [Creating a Configuration Analysis Report](#), page 105

Overview

Zoning enables you to partition your storage area network (SAN) into logical groupings of devices that can access each other. For example, you can partition your SAN into two zones, *winzone* and *unixzone*, so that your Windows servers and storage do not interact with your UNIX® servers and storage.

Zoning can be managed or accessed by the primary FCS switch only when security is enabled; the **Zone** icon displays only on the primary FCS switch. If security is not enabled, the **Zone** icon displays in the Fabric Toolbar of every licensed switch.

For specific information regarding secure fabrics, refer to the *HP StorageWorks Secure Fabric OS 4.2.x User Guide*.

Note: In the Zone Administration module, the buttons are designed to be disabled (grayed-out) if they are not operable. For example, the **Add Member** button is disabled if you have not selected a zoning element, or if the zoning element selected has already been added to the member list.

Zoning Schemes

Various levels of zoning (or zoning schemes) are created to isolate systems that have different operating environments. For example, you can create one zone of all ports connected to UNIX servers and another zone of all ports connected to Windows servers. Zones are created to limit access between devices connected to the fabric and within the same zone.

Zones can be configured dynamically. They can vary in size, depending on the number of fabric-connected devices; devices can belong to more than one zone. Because zone members can access only other members of the same zone, a device not included in a zone is not available to members of that zone.

Displaying the Zone Administration Module

To access the Zone Administration module:

1. Launch Web Tools, displaying the Switch Explorer.
2. Select the desired switch from the Fabric Tree. The Switch View of that switch opens.
3. Click the **Zone Administration** icon from the Fabric Toolbar. The login screen opens.
4. Enter the admin user name and password. The Zone Administration module opens.

Displaying the Enabled Zone Configuration

To view the enabled zone configuration:

1. Launch Web Tools, displaying the Switch Explorer.
2. Select the desired switch from the Fabric Tree. The Switch View of that switch opens.

The current zone configuration (if one is enabled) is displayed in the lower portion of the Switch Information View. If no zone configuration is enabled the field displays `none`.

Displaying the Zone Configuration Summary

To view a zone configuration summary report:

1. Launch Web Tools, displaying the Switch Explorer.
2. Select the desired switch from the Fabric Tree. The Switch View of that switch opens.
3. Click the **Zone Administration** icon from the Fabric Toolbar. The login screen opens.
4. Enter the admin user name and password. The Zone Administration module opens.
5. Select **File > Print Summary**. The Zone Configuration Summary dialog box opens.

Adding a World Wide Name (WWN) in the Zoning Database

To add a WWN to the zone database:

1. Launch Web Tools, displaying the Switch Explorer.
2. Select the desired switch from the Fabric Tree. The Switch View of that switch opens.
3. Click the **Zone Administration** icon from the Fabric Toolbar. The login screen opens.
4. Enter the admin user name and password. The Zone Administration module opens.
5. Select **Edit > Add a WWN**. The Add WWN dialog box opens.
6. Enter a WWN value in the **WWN** field.
7. Click **OK**. The Add WWN dialog box opens. This dialog box lists all the zoning elements that include the new WWN, including aliases, zones, and FA zones.
8. Click an item in the list to select or deselect and then click **Add** to add the new WWN to all the selected zoning elements. The WWN is added to the zoning database and can be used as a member.

Note: The added WWN does not need to currently exist in the Fabric. This procedure enables you to configure a WWN as a member in a zone configuration before adding that device to the fabric. It also allows you to add a WWN to all or most zoning entities.

Deleting a WWN in the Zone Database

To delete a WWN from the zone database:

1. Launch Web Tools, displaying the Switch Explorer.
2. Select the desired switch from the Fabric Tree. The Switch View of that switch opens.
3. Click the **Zone Administration** icon from the Fabric Toolbar. The login screen opens.
4. Enter the admin user name and password. The Zone Administration module opens.
5. Select **Edit > Delete a WWN**. The Delete WWN dialog box opens.
6. Enter a WWN value in the **WWN** field.
7. Click **OK**. The Delete WWN dialog box opens. This dialog box lists all the zoning elements that include the WWN.
8. Click an item in the list to select or unselect and click **Delete** to delete the WWN from all the selected zoning elements. The WWN is deleted from the zone database.

Replacing a WWN in the Zone Database

This procedure enables you to replace a WWN throughout the zone database. This is helpful when exchanging devices in your fabric and helps you to easily maintain your current configuration.

1. Launch Web Tools, displaying the Switch Explorer.
2. Select the desired switch from the Fabric Tree. The Switch View of that switch opens.
3. Click the **Zone Administration** icon from the Fabric Toolbar. The login screen opens.
4. Enter the admin user name and password. The Zone Administration module opens.
5. Select **Edit > Replace a WWN**. The Replace WWN dialog box opens.
6. Enter the WWN to be replaced in the **Replace** field.
7. Enter the new WWN in the **By** field.

8. Click **OK**. The Replace WWN dialog box opens. This dialog box lists all the zoning elements that include the WWN.
9. Click an item in the list to select or deselect and click the **Replace** button to replace the WWN in all the selected zoning elements. The old WWN is replaced in the zoning database by the new WWN, including within any alias or zone in which the old WWN was a member.

Searching for a Zone Member

To search for a zone member:

1. Launch Web Tools, displaying the Switch Explorer.
2. Select the desired switch from the Fabric Tree. The Switch View of that switch opens.
3. Click the **Zone Administration** icon from the Fabric Toolbar. The login screen opens.
4. Enter the admin user name and password. The Zone Administration module opens.
5. Select **Edit > Search Member**.
6. Type the zone member name in the **Member Name** field. Narrow the search by checking one or more of the checkboxes, such as **Match Case** (optional).
7. Click **Next** to begin the zone member search.

Selecting a Zoning Method

The zoning method you choose determines how members are displayed in the various member selection windows.

There are four methods of defining members for zoning:

- Mixed zoning, which enables you to define members using the port area number or device WWNs. This method is considered *soft zoning*.
- Port zoning, which enables you to define members using port area number only. This method is considered *hard zoning*.
- WWN zoning, which enables you to define members of a zone using device WWNs. This method is considered hard zoning.

For more specific information about zoning, or for information about configuring zoning using the Fabric OS command line interface, refer to the *HP StorageWorks Fabric OS 4.2.x Features User Guide* and the *HP StorageWorks Fabric OS 4.2.x Command Reference Guide*.

The zoning method you select determines what will be displayed in the subsequent Zone Administration windows. The zone method you choose is displayed in the header of the Zone Administration window.

Depending on the method you use to zone, certain tabs may or may not be available on the Zone Administration window.

The way zone objects are defined determines whether to use soft or hard zoning:

- **Hard Zoning.** In hardware-enforced zoning, zone or alias members are defined using *<domain, portarea>* exclusively or WWNs exclusively.
- **Soft Zoning.** In software-enforced zoning, zone or alias members can be defined by a mixture of port IDs and WWNs.

To select a zoning method:

1. Launch Web Tools, displaying the Switch Explorer.
2. Select the desired switch from the Fabric Tree. The Switch View of that switch opens.
3. Click the **Zone Administration** icon from the Fabric Toolbar. The login screen opens.
4. Enter the admin user name and password. The Zone Administration module opens.
5. From the **View** menu, select one of the following:
 - Mixed Zoning
 - Port Zoning
 - WWN Zoning
 - AL_PA Zoning

Refreshing the Zone Database

To refresh the zone database:

1. Launch Web Tools, displaying the Switch Explorer.

2. Select the desired switch from the Fabric Tree. The Switch View of that switch opens.
3. Click the **Zone Administration** icon from the Fabric Toolbar. The login screen opens.
4. Enter the admin user name and password. The Zone Administration module opens.
5. Select **View > Refresh Zoning**. This refreshes the zone database. Any unsaved zoning changes are deleted. The current zone database can be viewed from the Zone Configuration Summary screen. See [“Displaying the Zone Configuration Summary”](#) on page 84 for more information.

Refreshing the Fabric

To refresh the fabric:

1. Launch Web Tools, displaying the Switch Explorer.
2. Select the desired switch from the Fabric Tree. The Switch View of that switch opens.
3. Click the **Zone Administration** icon from the Fabric Toolbar. The login screen opens.
4. Enter the admin user name and password. The Zone Administration module opens.
5. Select **View > Refresh Fabric**. This refreshes the status for the fabric, including switches, ports, and devices.

Enabling a Zone Configuration

The **Actions > Enable a Config** option enables a configuration that has previously been created (see [“Creating a Zone Configuration”](#) on page 100). When the dialog box opens, select the desired configuration from the menu.

Several configurations can reside on a switch at once and you can quickly alternate between them. For instance, you might want to have one configuration enabled during the business hours and another enabled overnight. Only one zone configuration can be enabled at a time.

To create a new configuration, see [“Creating a Zone Configuration”](#) on page 100.

To enable a zone configuration:

1. Launch Web Tools, displaying the Switch Explorer.
2. Select the desired switch from the Fabric Tree. The Switch View of that switch opens.
3. Click the **Zone Administration** icon from the Fabric Toolbar. The login screen opens.
4. Select **Actions > Enable Config** to activate a configuration. The Enable Config dialog box opens.
5. Select the configuration to be enabled from the menu. A warning displays.
6. Click **Yes** to enable the selected configuration.

Disabling a Zoning Configuration

When you disable the active configuration, the zoning feature is disabled on the fabric and all devices within the fabric can communicate with all other devices. This does not mean that the zoning database is deleted however, only that there is no configuration active on the fabric.

The **Actions > Disable Zoning** option disables the enabled configuration. The Disable Config dialog box opens. When the zoning feature is disabled, the fabric is in non-zoning mode and all devices can freely access other devices in the fabric.

To disable a zoning configuration:

1. Launch Web Tools, displaying the Switch Explorer.
2. Select the desired switch from the Fabric Tree. The Switch View of that switch opens.
3. Click the **Zone Administration** icon from the Fabric Toolbar. The login screen opens.
4. Enter the admin user name and password. The Zone Administration module opens.
5. Select **Actions > Disable Zoning** to disable the current enabled configuration. The Disable Config warning displays.
6. Click **Yes** to disable the current configuration.

Saving Changes to an Existing Configuration

To save a configuration:

1. Launch Web Tools, displaying the Switch Explorer.
2. Select the desired switch from the Fabric Tree. The Switch View of that switch opens.
3. Click the **Zone Administration** icon from the Fabric Toolbar. The login screen opens.
4. Enter the admin user name and password. The Zone Administration module opens.
5. Click the **Config** tab.
6. Make desired changes to the configuration (see “[Creating a Zone](#)” on page 94).

Note: You can make changes to a configuration that is currently enabled. Changes do not appear, however, until the configuration is disabled and then re-enabled.

7. Select **Actions > Save Config Only**.

To enable the configuration, see “[Enabling a Zone Configuration](#)” on page 89.

Clearing the Zone Database

To disable any active configuration and delete the entire zone database:

1. Launch Web Tools, displaying the Switch Explorer.
2. Select the desired switch from the Fabric Tree. The Switch View of that switch opens.
3. Click the **Zone Administration** icon from the Fabric Toolbar. The login screen opens.
4. Enter the admin user name and password. The Zone Administration module opens.
5. Select the **Actions > Clear All**. The Disable Config warning displays.



WARNING: This action not only disables zoning on the fabric, but deletes the entire zone database.

6. Click **Yes** to disable the current configuration.

Creating a Zone Alias

An alias is a logical group of ports, WWNs, or AL_PAs. Specifying groups of ports or devices as an alias makes zone configuration easier, by enabling you to configure zones using an alias rather than a long string of individual members. You can specify members of an alias using the following methods:

- A switch domain and port area number pair: for example, 2, 20.
- WWN (device)

To create an alias:

1. Launch Web Tools, displaying the Switch Explorer.
2. Select the desired switch from the Fabric Tree. The Switch View of that switch opens.
3. Click the **Zone Administration** icon from the Fabric Toolbar. The login screen opens.
4. Enter the admin user name and password. The Zone Administration module opens.
5. Select one of the following methods to view members from the **View** menu:
 - Mixed Zoning
 - Port Zoning
 - WWN Zoning
 - AL_PA ZoningThe member view method you choose determines how members are displayed in the **Member Selection List**.
6. Click the **Alias** tab.
7. Click **Create Alias**. The Create New Alias dialog box opens.
8. Enter a name for the new alias.
9. Click **OK**.

10. Click + signs in the **Member Selection List** to view the nested elements. The choices available in the **Member Selection List** depend on the selection made in the **View** menu.
11. Select an element in the **Member Selection List** that you want to include in your alias. The **Add Member** button becomes active.
12. Click **Add Member** to add alias members. Selected members are moved to the Alias Members window.
13. Repeat steps 10 and 11 to add more elements to your alias.
14. Click **Add Other** to include a WWN or port that is not currently a part of the fabric (optional). The new alias displays in the **Name** list.

Modifying the Members of a Zone Alias

To modify the members of an alias:

1. Launch Web Tools, displaying the Switch Explorer.
2. Select the desired switch from the Fabric Tree. The Switch View of that switch opens.
3. Click the **Zone Administration** icon from the Fabric Toolbar. The login screen opens.
4. Enter the admin user name and password. The Zone Administration module opens.
5. Click the **Alias** tab (selected by default).
6. Select the alias you want to modify from the **Name** menu.
7. Highlight an element in the **Member Selection List** that you want to include in your alias or highlight an element in the **Alias Members** list that you want to delete.
8. Click **Add Member** to add an alias member. Click **Remove Member** to remove an alias member.

Deleting a Zone Alias

To delete an alias:

1. Launch Web Tools, displaying the Switch Explorer.

2. Select the desired switch from the Fabric Tree. The Switch View of that switch opens.
3. Click the **Zone Administration** icon from the Fabric Toolbar. The login screen opens.
4. Enter the admin user name and password. The Zone Administration module opens.
5. Click the **Alias** tab.
6. Select the alias you want to delete from the **Name** menu.
7. Click **Delete**. The Confirm Deleting Alias screen opens.
8. Click **OK**. The selected Alias is deleted from the zoning database.

Renaming a Zone Alias

To rename an alias:

1. Launch Web Tools, displaying the Switch Explorer.
2. Select the desired switch from the Fabric Tree. The Switch View of that switch opens.
3. Click the **Zone Administration** icon from the Fabric Toolbar. The login screen opens.
4. Enter the admin user name and password. The Zone Administration module opens.
5. Click the **Alias** tab (selected by default).
6. Select the alias you want to rename from the **Name** menu.
7. Click **Rename**. The Rename an Alias dialog box opens.
8. Enter a new alias name and click **OK**. The alias is renamed in the zone database.

Creating a Zone

A zone is a region within the fabric in which specified switches and devices can communicate. A device can communicate only with other devices connected to the fabric within its specified zone. You can specify members of a zone using the following methods:

- Alias names
- Switch domain and port area number pair; for example, 2 , 20.
- WWN (device)

To create a zone, perform the following steps:

1. Launch Web Tools, displaying the Switch Explorer.
2. Select the desired switch from the Fabric Tree. The Switch View of that switch opens.
3. Click the **Zone Administration** icon from the Fabric Toolbar. The login screen opens.
4. Enter the admin user name and password. The Zone Administration module opens.
5. Select one of the following methods to view members from the **View** menu:
 - Mixed zoning
 - Port zoning
 - WWN zoning
 - AL_PA zoning

Note: The member view method you choose determines how members are displayed in the **Member Selection List**. See [“Displaying the Zone Administration Module”](#) on page 84 for more information.

6. Click the **Zone** tab.
7. Click **Create**. The Create New Zone dialog box opens.
8. Enter a name for the new zone.
9. Click **OK**.
10. Click + signs in the **Member Selection List** to view the nested elements. The choices available in the **Member Selection List** depend on the selection made in the **View** Menu.
11. Select an element in the **Member Selection List** that you want to include in your zone. The **Add Member** button becomes active.
12. Click **Add Member** to add zone members. Selected members are moved to the Zone Members Window.

13. Repeat steps 10 and 11 to add more elements to your zone.
14. Click **Add Other** to include a WWN or port that is not currently a part of the fabric (optional). The new zone displays in the **Name** list.

Modifying the Members of a Zone

To modify the members of a zone:

1. Launch Web Tools, displaying the Switch Explorer.
2. Select the desired switch from the Fabric Tree. The Switch View of that switch opens.
3. Click the **Zone Administration** icon from the Fabric Toolbar. The login screen opens.
4. Enter the admin user name and password. The Zone Administration module opens.
5. Click the **Zone** tab.
6. Select the zone you want to modify from the **Name** menu.
7. Highlight an element in the **Member Selection List** that you want to include in your zone or highlight an element in the **Zone Members** list that you want to delete.
8. Click **Add Member** to add a zone member.
9. Click **Remove Member** to remove a zone member.

Deleting a Zone

To delete a zone:

1. Launch Web Tools, displaying the Switch Explorer.
2. Select the desired switch from the Fabric Tree. The Switch View of that switch opens.
3. Click the **Zone Administration** icon from the Fabric Toolbar. The login screen opens.
4. Enter the admin user name and password. The Zone Administration module opens.
5. Click the **Zone** tab.
6. Select the zone you want to delete from the **Name** drop-down menu.
7. Click **Delete**. The Confirm Deleting Zone dialog box opens.
8. Click **OK**. The selected zone is deleted from the zoning database.

Renaming a Zone

To rename a zone:

1. Launch Web Tools, displaying the Switch Explorer.
2. Select the desired switch from the Fabric Tree. The Switch View of that switch opens.
3. Click the **Zone Administration** icon from the Fabric Toolbar. The login screen opens.
4. Enter the admin user name and password. The Zone Administration module opens.
5. Click the **Zone** tab.
6. Select the zone you want to rename from the **Name** menu.
7. Click **Rename**. The Rename a Zone dialog box opens.
8. Enter a new zone name and click **OK**. The zone is renamed in the zone database.

Creating a Fabric Assist Zone

For this example, the Mixed Zone level is used.

To create a fabric assist zone:

1. Launch Web Tools, displaying the Switch Explorer.
2. Select the desired switch from the Fabric Tree. The Switch View of that switch opens.
3. Click the **Zone Administration** icon from the Fabric Toolbar. The login screen opens.
4. Enter the admin user name and password. The Zone Administration module opens.
5. Select **View > Mixed Zoning**. You can select any view other than the **Device View**. The **Mixed View** tab opens.
6. Click the **Fabric Assist** tab.
7. Click **Create**. The Create New FA dialog box opens.
8. Enter a name for the new Fabric Assist zone and click **OK**.

Note: A fabric host is required.

9. Highlight the desired Fabric Assist zone members from the **Member Selection List**.
10. Click **Add Member**. The new members appear in the **Fabric Assist Members** area. The newly created Fabric Assist zone also displays in the **Config** tab.

Adding and Removing Fabric Assist Zone Members

To modify the members of a Fabric Assist zone:

1. Launch Web Tools, displaying the Switch Explorer.
2. Select the desired switch from the Fabric Tree. The Switch View of that switch opens.
3. Click the **Zone Administration** icon from the Fabric Toolbar. The login screen opens.
4. Enter the admin user name and password. The Zone Administration module opens.
5. Click the **Fabric Assist** tab.
6. Select the Fabric Assist zone you want to modify from the **Name** menu.
7. Highlight an element in the **Member Selection List** that you want to include in your Fabric Assist zone or highlight an element in the **Fabric Assist Zone Members** list that you want to delete.
8. Click **Add Member** to add a Fabric Assist zone member or click **Remove Member** to remove an Fabric Assist zone member.

Deleting a Fabric Assist Zone

To delete a Fabric Assist zone:

1. Launch Web Tools, displaying the Switch Explorer.
2. Select the desired switch from the Fabric Tree. The Switch View of that switch opens.
3. Click the **Zone Administration** icon from the Fabric Toolbar. The login screen opens.
4. Enter the admin user name and password. The Zone Administration module opens.
5. Click the **Fabric Assist Zone** tab.
6. Select the Fabric Assist zone you want to delete from the **Name** menu.
7. Click **Delete**. The Confirm Deleting Fabric Assist Zone dialog box opens.
8. Click **OK**. The selected Fabric Assist zone is deleted from the zoning database.

Renaming a Fabric Assist Zone

To rename a Fabric Assist zone:

1. Launch Web Tools, displaying the Switch Explorer.
2. Select the desired switch from the Fabric Tree. The Switch View of that switch opens.
3. Click the **Zone Administration** icon from the Fabric Toolbar. The login screen opens.
4. Enter the admin user name and password. The Zone Administration module opens.
5. Click the **Fabric Assist** tab.
6. Select the Fabric Assist zone you want to rename from the **Name** menu.
7. Click **Rename**. The Rename a Fabric Assist Zone dialog box opens.
8. Enter a new Fabric Assist zone name and click **OK**. The Fabric Assist zone is renamed in the zoning database.

Creating a Zone Configuration

A configuration is a group of zones. Zoning is enabled on a fabric by enabling a specific configuration. You can specify members of a configuration using the following methods:

- Zone names
- FA (Fabric Assist) zone names

Sample Configuration

[Table 9](#) shows a sample zoning configuration.

Table 9: Sample Zoning Database

Alias	Zone	Configuration
alias1 = WWN; WWN; WWN	N/A	N/A

Table 9: Sample Zoning Database

Alias	Zone	Configuration
alias2 = WWN; <domain, portarea>	N/A	N/A
alias3 = WWN; <AL_PA>	zone1 = alias1; alias2; WWN; <domain, portarea>; <ALPA>	N/A
alias4 = WWN; WWN; WWN	zone2 = alias3, alias4, WWN	myconfig = zone1, zone2

To create a zone configuration:

1. Launch Web Tools, displaying the Switch Explorer.
2. Select the desired switch from the Fabric Tree. The Switch View of that switch opens.
3. Click the **Zone Administration** icon from the Fabric Toolbar. The login screen opens.
4. Enter the admin user name and password. The Zone Administration module opens.
5. Optional: If you want to stay with mixed zoning (default), skip this step. Otherwise, select one of the following methods to view members from the **View** menu:
 - Mixed zoning
 - Port zoning
 - WWN zoning
 - AL_PA zoning

Note: The member view method you choose determines how members are displayed in the **Member Selection List**. See [“Displaying the Zone Administration Module”](#) on page 84 for more information.

6. Click the **Config** tab.
7. Click **Create**. The Create New Config dialog box opens.
8. Enter a name for the new configuration and click **OK**.

9. Click + signs in the **Member Selection List** to view the nested elements. The choices available in the **Member Selection List** depend on the selection made in the **View** menu.
10. Highlight an element in the **Member Selection List** that you want to include in your configuration. The **Add Member** button becomes active.
11. Click **Add Member** to add configuration members. Selected members are moved to the Config Members window.
12. Repeat steps 10 and 11 to add more elements to your configuration.
13. Select the **Actions > Save Config Only** option. The new configuration displays in the **Name** list. To enable the configuration, see [“Enabling a Zone Configuration”](#) on page 89.

Note: Any changes made to the currently enabled configuration do not appear until the configuration is re-enabled.

Adding or Removing Zone Configuration Members

To add or remove the members of a zone configuration:

1. Launch Web Tools, displaying the Switch Explorer.
2. Select the desired switch from the Fabric Tree. The Switch View of that switch opens.
3. Click the **Zone Administration** icon from the Fabric Toolbar. The login screen opens.
4. Enter the admin user name and password. The **Zone Administration** module opens.
5. Click the **Config** tab.
6. Select the configuration you want to modify from the **Name** drop-down menu.
7. Highlight an element in the **Member Selection List** that you want to include in your configuration or highlight an element in the **Config Members** list that you want to delete.
8. Click **Add Member** to add a configuration member or click **Remove Member** to remove a configuration member.

Note: You can make changes to a configuration that is currently enabled, but changes do not appear until the configuration is re-enabled.

9. Select **Actions > Save Config Only**.

To enable the configuration, see “[Enabling a Zone Configuration](#)” on page 89.

Deleting a Zone Configuration

Note: You cannot delete a currently enabled configuration.

To delete a disabled configuration:

1. Launch Web Tools, displaying the Switch Explorer.
2. Select the desired switch from the Fabric Tree. The Switch View of that switch opens.
3. Click the **Zone Administration** icon from the Fabric Toolbar. The login screen opens.
4. Enter the admin user name and password. The Zone Administration module opens.
5. Click the **Config** tab.
6. Select the configuration you want to delete from the **Name** menu.
7. Click **Delete**. The Confirm Deleting Config dialog box opens.
8. Click **OK**. The selected configuration is deleted from the configuration database.

Renaming a Zone Configuration

To rename a configuration:

1. Launch Web Tools, displaying the Switch Explorer.
2. Select the desired switch from the Fabric Tree. The Switch View of that switch opens.
3. Click the **Zone Administration** icon from the Fabric Toolbar. The login screen opens.
4. Enter the admin user name and password. The Zone Administration module opens.
5. Click the **Config** tab.
6. Select the configuration you want to rename from the **Name** menu.
7. Click **Rename**. The Rename a Config dialog box opens.
8. Enter a new configuration name and click **OK**. The configuration is renamed in the configuration database.

Note: You can make changes to a configuration that is currently enabled, but changes do not appear until the configuration is re-enabled.

9. Select **Actions > Save Config Only** to save the configuration changes.

To enable the configuration, see “[Enabling a Zone Configuration](#)” on page 89.

Creating a Configuration Analysis Report

To create a configuration analysis report:

1. Launch Web Tools, displaying the Switch Explorer.
2. Select the desired switch from the Fabric Tree. The Switch View of that switch opens.
3. Click the **Zone Administration** icon from the Fabric Toolbar. The login screen opens.
4. Enter the admin user name and password. The Zone Administration module opens.
5. Click the **Config** tab.
6. Select a Configuration to be analyzed from the **Name** menu.
7. Select **Analyze Config**. An analysis window opens.
8. Review the configuration analysis, which lists:
 - SAN components (ports, WWNs, and AL_PAs) that are not included in the configuration
 - SAN components (ports, WWNs, and AL_PAs) that are contained in the configuration but not in the fabric

Troubleshooting Web Tools

8

This chapter discusses the following major topics:

- [Recommendations](#), page 108
- [Web Tools Limitations](#), page 109
- [Firmware Download](#), page 116
- [Loss of Connection](#), page 117
- [HTTP Time-out](#), page 118

Recommendations

Listed below are recommendations when working with WebTools:

- When using a mixed fabric, that is a fabric containing V4.x, V3.x and V2.x switches, we recommend that you use the most advanced switches to control the fabric. For example, use the V4.x switches as the Primary FCS, the location to perform zoning tasks, and the time server (CLI). We also recommend that you use the most recently released firmware on your switches.
- Switches can be accessed simultaneously from different connections (for example, Web Tools, CLI, and API). If this happens, changes from one connection may not be updated to the other, and some modifications may be lost. Make sure when connecting with simultaneous multiple connections, that you do not overwrite the work of another connection.
- A number of tasks in Web Tools are designed to make fabric level changes, for example the zoning windows. When executing fabric level configuration tasks, be sure to allow time for the changes to propagate across the fabric before executing any sequential tasks. For a large fabric, this may require a few minutes.
- Some check boxes in Web Tools can be inadvertently selected when highlighting a row. For example, the **Trunking Enabled** and **Port Enabled** checkboxes in the **Port Settings** tab of the Switch Administration window. When you complete a configuration task in Web Tools, be sure to verify any changes that you made.
- Many of the Switch View windows are automatically closed when you select a different switch in the tree view. This is normal behavior and is designed to prevent configuration changes being performed on the wrong switch.
- In the Zone Administration window, the buttons are designed to be disabled (grayed-out) if they are not operable. For example, the **Add Member** button is disabled if you have not selected a zoning element, or if the zoning element selected has already been added to the member list.
- A maximum of five simultaneous HTTP sessions are allowed to any one switch. The HTTP sessions include Fabric Manager and Web Tools, and any combinations of the two interfaces.

Web Tools Limitations

This section provides information on limitations of Web Tools.

Opening Modules in a Secure Fabric

The following are the known limitations in Web Tools relating to the Security feature:

- Abnormal behavior may be seen if attempting to open two modules simultaneously in a secure fabric. A known Java Plug-in problem may cause the Secure Login dialog box to close, if you click on some area out of the dialog box, but within other applets.
Workaround: When opening modules in a Secure fabric, log in to one module at a time, and complete the login process before proceeding another task. For example, if you want to access Zone Administration and Switch Administration modules, open one of the modules, log in, and wait for the first module to fully load before opening the second module.

Core Switch 2/64 Limitations

The following are the known limitations in Web Tools relating to the Core Switch 2/64:

- For the Core Switch 2/64, neither CP is updated in the Switch View when switch 0 is being rebooted. The CP data displayed on this Switch View is dependent on Switch 0 and that data is not available when Switch 0 is rebooting.
Workaround: Wait until reboot is finished and Switch View polling occurs; the CPs will then be updated properly.
- Rarely during a failover event, independent Web Tools clients operating on different machines may see slight differences in the management of those Core Switch 2/64 switches participating in the failover event.
Workaround: There is no workaround.
- Under some circumstances where the HP StorageWorks 1 GB or 2 GB switches may be experiencing high memory usage, the Core Switch 2/64 Fabric View displays a fixed gray background area that says `Loading Java Applet...`. This may also occur when a switch leaves the fabric simultaneously with a network problem. The period of loss of network connectivity for Web Tools varies with different configurations.

Workaround: Ensure that any HP StorageWorks 1 GB or 2 GB switches are upgraded with the recommended code versions to work optimally with the Core Switch 2/64 switches.

- Occasionally, other switches that are not Core Switch 2/64 switches may display the port ICONs correctly, but may be missing one or more control button icons.

Workaround: Close the Switch View of the HP StorageWorks 1 GB or 2 GB switches and reopen it.

- Due to the nature of the Core Switch 2/64 having two logical switches, the Java Plug-in may sometimes have problems focusing on a particular field in an open applet, if you have the same window open for both logical switches.

Workaround: When this problem occurs, close and relaunch the affected applet.

Refresh Limitations

The following are the known limitations in Web Tools, relating to the browser:

- When you have a large number of Web Tools pages open with a heavy workload, you may occasionally see remnants of other pages or incomplete graphics on the screen.

Workaround: Refresh the window that is displaying incorrectly.

- Occasionally, users may request reports such as Fabric Events, Switch Report, Port Settings, and others that may not display information or that display partial information for a given switch believed to be in the fabric.

Workaround: Refresh the page or close the specific Web page and request it again.

- When a pop-up window requesting a user response is pushed into the background and refresh is requested, a fatal Internet Explorer error may occur.

Workaround: Restart the browser.

- Web Tools must be restarted when the Ethernet IP address is changed using the `NetworkConfig View` command. Web Tools seems to hang if it is not restarted after this operation is executed.

Workaround: Restart the browser.

- If you change the Switch Name or Domain ID using the CLI after the Web Tools Switch Administration has started, the new Switch Name or Domain ID will not be updated on the header of the Switch Administration window.

Clicking the **Refresh** button does not fix the problem.

Workaround: Activate the **Switch Information** tab and the Switch Administration header will update.

- If you change the Switch Name using the Web Tools Switch Administration page or SNMP and then open a Telnet window to verify the name change, the CLI prompt (for example, **switch:admin>**) displays the previous name. The Telnet prompt cannot pick up the new switch name until the switch is fastbooted.

Workaround: To display the correct switchname in the CLI prompt after a switchname update using Web Tools or SNMP, *fastboot* the switch.

- When working with License Keys in Web Tools there may be a disconnect between licenses added in the CLI and those added in Web Tools.

Workaround: To view recently added license keys in Web Tools you may have to close the current browser and open a new window.

- Following a switch enable or disable, it is necessary to wait at least 25 to 30 seconds for the fabric to reconfigure and for FSPF route calculations to complete before requesting routing information. If accessed too early, routing information is be shown.

Workaround: Following a switch enable or disable, wait at least 25 to 30 seconds before further action.

- The Web Tools Switch Explorer may continue to display a switch from the Switch View, even when the switch has been removed from the fabric.

Workaround: If this behavior is seen, reload the Switch Explorer. If the switch was removed from the fabric, the Fabric View window will then list the switch as unavailable.

- When you log in to the Web Tools Switch Administration window as a root user, password changes to the admin or user account information are not applied to the switch. This occurs whether secure mode is on or off.

Workaround: Log in as an admin user when modifying the admin or user account passwords in Web Tools.

Port Swapping Limitations

The following are the known limitations in Web Tools, relating to the port swapping:

- The Web Tools Zone Administration windows can display only partial port swapping information in the fabric due to Fabric OS limitations. Basically, port swapping information is available only on the launching switch in the fabric. If port swapping occurs in switches other than the switch from which

Web Tools is launched, the Zone Administration page will *not* show the port swapping information for those remote switches.

Workaround: To view port swapping information for a remote non-primary FCS switch in a secure fabric, use the **Switch Admin Port Setting** tab instead of Zone Administration windows. To view port swapping information for a non-secured fabric, use the Zone Administration window from the remote switch directly.

License Limitations

The following is a known limitation in Web Tools relating to the Web Tools license key:

- When the Web license is removed after Web Tools application windows are opened, Web Tools displays Web the license missing dialog box. The behavior is undefined if you continue with other operations after the Web Tools license is missing.

Workaround: Follow the error dialog box instructions to recover the Web license or close all the Web Tools application windows.

Browser Limitations

The following are the known limitations in Web Tools relating to the browser:

- The Fabric Watch, Switch Administration, HA, Name Server, or Zone Administration modules are separate applets embedded in the HTML pages. The successful launch of the applet depends on whether the browser can successfully load the HTML page. Very occasionally you will see a blank browser window open with `loading pages...` that is stuck. This is probably caused by a sudden loss of switch Web server (either by normal HA failover, reboot, or other cause).

Workaround: If the Fabric Watch, Switch Administration, HA, Name Server, or Zone Administration modules hang, close the window and relaunch the module.

- A Web Tools browser window may stop responding following an HA failover immediately after a zoning configuration was enabled or disabled. It is likely that the Web daemon was terminated by the HA failover before the http request was sent back.

Workaround: If one of the Web Tools modules is hanging, close the window and relaunch the module. If the module is locked, shut down and relaunch the Web Tools application.

- Due to a defect with the Java Plug-in 1.4.1_02 (Java Bug Id 4751259) in combination with Internet Explorer 6.0 on Windows XP, when you frequently enable or disable a switch or perform a power cycle, the Switch View may not display properly, and launching other Web Tools components may cause a browser crash.
Workaround: You should upgrade your Java Plug-in version to 1.4.1_06 or later with Windows XP.

Performance Monitor Limitations

The following are the known limitations in Web Tools relating to Performance Monitor:

- If the Web browser crashes or the Performance Monitor license is lost while the Performance Monitor module is running, some of the Performance Monitor resources owned by Web Tools may not be cleaned up correctly.
Workaround: You may need to use the CLI interface to manually delete these counters. For example, if you detect Web Tools owned resources (using `perfshoweemonitor`), but you have verified that no Web users are actually using them, use the `perfdeleemonitor` or `perfcleareemonitor` command to free the resources.
- For SCSI Read, Write, or Read/Write on a LUN per Port graphs, Fabric OS V4.1 (and later 4x versions) allows users to enable only two bytes or less for the LUN value mask setting. Fabric OS V3.1 (and later 3x versions) allow up to three bytes. Web Tools displays an error message once you have exceeded this limit.
Workaround: There is no workaround.

Extended Fabric Limitations

The following are the known limitations in Web Tools related to Extended Fabric:

- Intermittently, the **Extended Fabric** tab cannot be refreshed after long distance configuration changes.
Workaround: Close and restart the Switch Administration window.
- Fabric OS V4.1: The Extended Fabric panel in Switch Administration window may display the message `Failed to retrieve data from switch` when a port is in a faulty state or is currently negotiating the port speed. You can verify from Port Setting Panel - Port State column which port state is `Port_Flt` or port speed is `Auto`.
Workaround: Disable the faulty port from the Port Setting Panel. If the port

speed is `Auto` and the port state is not `Port_Flt`, enable the port with the speed listed as `Auto`, click the **Apply** button, and then continue with other operations.

- Fabric OS 3.1: The Extended Fabric panel in the Switch Administration window may have a temporary refresh delay or it may display the message `ExtendedFabricPanel: Doc is NULL` when a port is in a faulty state or is currently negotiating the port speed. If this message displays, close the Switch Administration window and then reopen it. You can verify from the Port Setting Panel - Port State column which port state is `Port_Flt` or port speed is `Auto`.

Workaround: Disable the faulty port from the Port Setting Panel. If the port speed is `Auto` and the port state is not `Port_Flt`, enable the port with the speed listed as `Auto`, click the **Apply** button, and then continue with other operations.

- When a faulty blade exists, all other components display previous port values for a port within the faulty blade. The Web Tools Extended Fabric module displays the `Failed to retrieve data from switch` error. This blocks Extended Fabrics information (on healthy blades) from displaying in Web Tools.

Workaround: Remove the faulty blade from the chassis. You will then be able to view Extended Fabric configurations for the other blades. You can also use the CLI to manage the other non-faulty blades.

Telnet Button Limitations

The following are the known limitations in Web Tools related to the **Telnet** button:

- On a Solaris OS v8.0 system, a Telnet session cannot be launched using the **Telnet** button in Web Tools if the path of the xterm application is not included in the PATH environment variable.

Workaround: This path varies from machine to machine, so contact your system administrator to find out the correct path of the xterm application; include this variable in the default environment setup file.

- Mozilla browsers do not support the Telnet application.

Workaround: Use Netscape or the command line interface.

Java Plug-in Limitations

The following are the known limitations in Web Tools, relating to the Java Plug-in version:

- When using Web Tools V4.1 to view a V3.0.2 switch, the Switch View displays two views in the same window. This problem is caused by the 1.3 Java Plug-in on the V3.0.2 switch.
Workaround: Issue the `httpcfgset` command to correct the Java Plug-in version to 1.2.2 or 1.3.1.
- When there is a dialog box opened for a module (for example, Switch Administration, Zone Administration, or Fabric Watch) and you try to open another module, the initial login dialog box receives an error and closes. This is a known defect in the Java 1.3.1_04 Plug-in, and is documented in <http://java.sun.com/>, Bug ID 4763605.
Workaround: Close and reopen the module.

Network Configuration Limitations

The following is a known limitation in Web Tools related to the Network Config tab:

- When changing the switch IP properties from the **Network Config** tab, if the change cannot be committed because user input is invalid or indicates a duplicate IP netmask, a dialog box opens to display a return error message and all the Switch Administration tabs are disabled.
Workaround: Close the Switch Administration window and restart it.

Windows OS Limitations

- Occasionally, you will not see the `Lost connection to the switch` message on the Switch View even though the Ethernet connection has been lost. You may still be able to invoke various features from Switch View such as Status, Info, Fan Temp, Power, and Beacon. This problem may be seen in the Core Switch 2/64, for example, when you see the `Lost connection to the switch` error for a single switch in the chassis, or when a lost connection affects both logical switches.
Workaround: Verify the Ethernet connection to the switch by pinging the logical switch IP address.
- In Web Tools, under the Admin- Routing page, when viewing the details of the Routing Table in a pop-up window, the open window locks out all other input on other views that are open for any switch.
Workaround: If you are locked out of adding input to Web Tools windows, verify that you do not have a pop-up window open. You must close this window using the windows X close icon.

Mozilla on Solaris Limitations

The following is a known limitation in Web Tools related to Mozilla on Solaris:

- When running firmware download under Web Tools on a Solaris Mozilla browser, the firmware download completion pop-up window can easily be put into the background. This can give the appearance of Web Tools sessions that are locked out.
Workaround: If a user is apparently locked out of other windows in the Solaris Mozilla environment, look for a pop-up window that needs to be dismissed before proceeding further.

Firmware Download

There are multiple phases involved with firmware download and activation. When Web Tools reports that firmware download has been completed successfully, this indicates that a basic sanity check, package retrieval, package unloading, and verification were successful.

Note: Web Tools currently forces a full package install. To perform an incremental upgrade, use the Fabric OS CLI.

A reboot is required to activate the newly downloaded firmware. The reboot is done automatically from the Web Tools user perspective and results in a loss of network connectivity with Web Tools. Web Tools screens continue to be visible during the reboot, but are not available. Wait approximately 10 minutes to ensure that all of the application windows have been restored. If Web Tools fails to respond after 20 minutes, you may need to close all Web Tools applications windows and restart them, or contact their system administrator for network assistance.

The Web Tools loss of network connectivity during a failover or reboot (initiated though the `firmwaredownload`) varies for different configurations:

- Core Switch 2/64 with dual CP - loss of network connectivity due to failover is approximately 1 minute.
- Core Switch 2/64 with single CP - loss of network connectivity due to reboot is approximately 4 minutes if **diagpost** is disabled and up to 16 minutes if **diagpost** is enabled.

- SAN Switch 2/32 - loss of network connectivity due to reboot is approximately 4 minutes if **diagpost** is disabled and 8 minutes if **diagpost** is enabled.
- SAN Switch 2/16 and SAN Switch 2/8-EL - a `firmwaredownload` followed by a fastboot from Fabric OS V3.1 will cause loss of connection. Web Tools must be closed and relaunched. Abnormal behavior occurs if you do not close Web Tools promptly. This behavior includes multiple Java error message dialogs that could block user input. In this case, shut down Web Tools through the Task Manager.

Loss of Connection

Occasionally, you may see a dialog box open when you try to retrieve data from a switch or apply some request to the switch:

```
Switch Status Checking
```

```
The switch is not currently accessible.
```

The dialog box title may vary, because it indicates which module is having the problem. This is caused by the loss of http connection with the switch, due to a variety of possible problems. Web Tools automatically tries to regain the connection. While Web Tools is trying to regain the connection, check whether your Ethernet connection is still functioning. If the problem is not with the Ethernet connection, wait for Web Tools to recover the connection and display the following message:

```
You will have to resubmit your request after closing this message.
```

If the temporary switch connection loss is caused by the switch hot code load or other operation, the Switch Explorer you are currently running may be downloaded from a different firmware version than the new one. In this case, the following message displays:

```
Switch connection is restored. The firmware version you are running is not in sync with the version currently on switch. Close your browser and re-launch Webtools.
```

Close Switch Explorer and relaunch Web Tools to reopen the connection.

HTTP Time-out

Very occasionally, you may see the following message when you try to get some data from a switch or try to apply some request to the switch:

```
Failed to get switch response. Please verify the status  
of your last operation and try again if necessary.
```

This indicates that an HTTP request did not get a response. The request was sent to the switch but the connection was down, probably caused by a temporary loss of Web server on switch. Due to the nature of an HTTP connection, Web Tools reports this error after a 90-second default time out.

In this case, first verify the status of your last request using Telnet to check related status or click the **Refresh** button from the Web Tools application you were working on to retrieve related data. If your request did not get through to the switch, resubmit the request. Executing Refresh from Web Tools retrieves a copy of switch data at that moment, the data you entered may be lost if it has not committed to the switch yet.

glossary

This glossary defines terms used in this guide or related to this product and is not a comprehensive glossary of computer terms.

AL_PA

Arbitrated loop physical address. A unique 8-bit value assigned during loop initialization to a port in an arbitrated loop. Alternately, “arbitrated loop parameters.”

alias

A logical grouping of elements in a fabric. An alias is a collection of port numbers and connected devices, used to simplify the entry of port numbers and WWNs when creating zones.

alias address identifier

An address identifier recognized by a port in addition to its standard identifier. An alias address identifier can be shared by multiple ports. *See also* [alias](#).

alias AL_PA

An AL_PA value recognized by an L_Port in addition to the AL_PA assigned to the port. *See also* [AL_PA](#).

alias server

A fabric software facility that supports multicast group management.

ANSI

American National Standards Institute.

API

Application programming interface. A defined protocol that allows applications to interface with a set of services.

arbitrated loop

A shared 100-MB/sec Fibre Channel transport structured as a loop. Can support up to 126 devices and one fabric attachment. *See also* [topology](#).

area number

In Fabric OS V4.0 and above, ports on a switch are assigned a logical area number. Port area numbers can be viewed by entering the `switchshow` command. They are used to define the operative port for many Fabric OS commands: for example, area numbers can be used to define the ports within an alias or zone.

authentication

The process of verifying that an entity in a fabric (such as a switch) is what it claims to be. *See also* [digital certificate](#), [switch-to-switch authentication](#).

bandwidth

The total transmission capacity of a cable, link, or system. Usually measured in bps (bits per second). Can also refer to the range of transmission frequencies available to a link or system. *See also* [throughput](#).

beacon

A tool in which all of the port LEDs on a switch are set to flash from one side of the switch to the other, to enable identification of an individual switch in a large fabric. A switch can be set to beacon by a CLI command or through Advanced Web Tools.

bit synchronization

The condition in which a receiver is delivering retimed serial data at the required bit error rate.

block

As it applies to Fibre Channel technology, upper-level application data that is transferred in a single sequence.

bypass circuitry

Circuits that automatically remove a device from the data path when valid signals are dropped.

CA

Certificate authority. A trusted organization that issues digital certificates. *See also* [digital certificate](#).

cascade

Two or more interconnected Fibre Channel switches. HP StorageWorks 1 GB and later switches can be cascaded up to 239 switches, with a recommended maximum of seven interswitch links (no path longer than eight switches). *See also* [fabric](#), [ISL](#).

CFG

Configuration.

chassis

The metal frame in which the switch and switch components are mounted.

CIM

Common Information Model. A management structure enabling disparate resources to be managed by a common application.

circuit

An established communication path between two ports. Consists of two virtual circuits capable of transmitting in opposite directions.

Class 1 service

The class of frame-switching service for a dedicated connection between two communicating ports (also called “connection-oriented service”). Includes acknowledgement of frame delivery or nondelivery.

Class 2 service

A connectionless class of frame-switching service that includes acknowledgement of frame delivery or nondelivery.

Class 3 service

A connectionless class of frame-switching service that does not include acknowledgement of frame delivery or nondelivery. Can be used to provide a multicast connection between the frame originator and recipients, with acknowledgement of frame delivery or nondelivery.

Class 4 service

A connection-oriented service that allows fractional parts of the bandwidth to be used in a virtual circuit.

Class 6 service

A connection-oriented multicast service geared toward video broadcasts between a central server and clients.

Class F service

The class of frame-switching service for a direct connection between two switches, allowing communication of control traffic between the E_Ports. Includes acknowledgement of data delivery or nondelivery.

class of service

A specified set of delivery characteristics and attributes for frame delivery.

CLI

Command line interface. An interface that depends entirely on the use of commands, such as through Telnet or SNMP, and does not involve a GUI.

client

An entity that, using its common transport (CT), makes requests of a server.

community (SNMP)

A relationship between a group of SNMP managers and an SNMP agent, in which authentication, access control, and proxy characteristics are defined. *See also* [SNMP](#).

compact flash

Flash (temporary) memory that is used in a manner similar to hard disk storage. It is connected to a bridging component that connects to the PCI bus of the processor. Not visible within the processor's memory space.

configuration

(1) A set of parameters that can be modified to fine-tune the operation of a switch. Use the `configshow` command to view the current configuration of your switch.

(2) In zoning, a zoning element that contains a set of zones. The Configuration is the highest-level zoning element and is used to enable or disable a set of zones on the fabric. *See also* [zone configuration](#).

congestion

The realization of the potential of oversubscription. A congested link is one on which multiple devices are contending for bandwidth.

connection initiator

A port that has originated a Class 1 dedicated connection and received a response from the recipient.

connection recipient

A port that has received a Class 1 dedicated connection request and transmitted a response to the originator.

controller

A computer module that interprets signals between a host and a peripheral device. The controller typically is part of the peripheral device.

core PID

Core switch port identifier. The core PID must be set for Fabric OS V3.1 and earlier switches included in a fabric of V4.1 switches. This parameter is located in the `configure` command of firmware versions V3.1 and earlier. All V4.1 switches and above use the core PID format by default; this parameter is not present in the `configure` command for these switches.

COS

Class of service.

CP

Control processor.

credit

As it applies to Fibre Channel technology, the number of receive buffers available to transmit frames between ports. *See also* [EE_Credit](#).

cut-through

A switching technique that allows the route for a frame to be selected as soon as the destination address is received. *See also* [route](#).

D_ID

Destination identifier. A 3-byte field in the frame header, used to indicate the address identifier of the N_Port to which the frame is headed.

DAS

Direct attached storage.

datagram

A Class 3 Fibre Channel service that allows data to be sent quickly to devices attached to the fabric, without receipt confirmation.

defined zone configuration

The set of all zone objects defined in the fabric. Can include multiple zone configurations. *See also* [enabled zone configuration](#), [zone configuration](#).

deskew

Related to the Trunking feature. The time difference between traffic traveling over each ISL other than the shortest ISL in the group and traffic traveling over that shortest ISL. The deskew number corresponds to nanoseconds divided by 10. The firmware automatically sets the minimum deskew value of the shortest ISL to 15.

DHCP

Dynamic Host Configuration Protocol.

DHCPD

Dynamic Host Configuration Protocol daemon.

digital certificate

An electronic document issued by a CA (certificate authority) to an entity, containing the public key and identity of the entity. Entities in a secure fabric are authenticated based on these certificates. *See also* [authentication](#), [CA](#).

disparity

The proportion of 1s and 0s in an encoded character. “Neutral disparity” means an equal number of each, “positive disparity” means a majority of 1s, and “negative disparity” means a majority of 0s.

DLS

Dynamic load-sharing. Dynamic distribution of traffic over available paths. Allows for recomputing of routes when an Fx_Port or E_Port changes status.

domain controller

A domain controller (or embedded port) communicates with and gets updates from other switches' embedded ports. The well-known address is *fffcd*, where *dd* = domain number.

domain ID

A unique identifier for all switches in a fabric, used in routing frames. Usually automatically assigned by the principal switch but can be assigned manually. The domain ID for a HP StorageWorks switches can be any integer between 1 and 239.

E_D_TOV

Error-detect timeout value. The minimum amount of time a target waits for a sequence to complete before initiating recovery. Can also be defined as the maximum time allowed for a round-trip transmission before an error is declared. *See also* [R_A_TOV](#), [RR_TOV](#).

E_Port

Expansion port. A type of switch port that can be connected to an E_Port on another switch to create an ISL. *See also* [ISL](#).

ECCN

Export classification control number. A government classification of encryption. For example, SSH is in the high-encryption category (number 5x02) and therefore has certain restrictions regarding its transfer.

EE_Credit

End-to-end credit. The number of receive buffers allocated by a recipient port to an originating port. Used by Class 1 and 2 services to manage frame exchange across the fabric, between source and destination. *See also* [end-to-end flow control](#).

EIA rack

A storage rack that meets the standards set by the Electronics Industry Association (EIA).

ELP

Exchange link parameters.

ELS

Extended link service. ELSs are sent to the destination N_Port to perform the requested function or service. ELS is a Fibre Channel standard that is sometimes referred to as “Fibre Channel Physical (FC_PH) ELS.”

EM

Environmental monitor. Monitors FRUs and reports failures.

embedded port

An embedded port (or domain controller) communicates and get updates from other switches' embedded ports. The well-known address is *fffcd*, where *dd* = domain number.

EMI

Electromagnetic interference.

Emulex

A brand of host bus adapter.

enabled zone configuration

The currently enabled configuration of zones. Only one configuration can be enabled at a time. *See also* [defined zone configuration](#), [zone configuration](#).

end-to-end flow control

Governs flow of Class 1 and 2 frames between N_Ports. *See also* [EE_Credit](#).

entry fabric

The basic software license that allows one E_Port per switch.

EOF

End of frame. A group of ordered sets used to mark the end of a frame.

error

As it applies to the Fibre Channel industry, a missing or corrupted frame, timeout, loss of synchronization, or loss of signal (link errors). *See also* [loop failure](#).

Ethernet

Popular protocols for LANs.

exchange

The highest-level Fibre Channel mechanism used for communication between N_Ports. Composed of one or more related sequences, it can work in either one or both directions.

F_Port

Fabric port. A port that is able to transmit under fabric protocol and interface over links. Can be used to connect an N_Port to a switch. *See also* [FL_Port](#), [Fx_Port](#).

F_RJT

Fabric port reject frame. A frame issued by the fabric to indicate that delivery of a frame is being denied, perhaps because a class is not supported, there is an invalid header, or no N_Port is available.

fabric

A Fibre Channel network containing two or more switches in addition to hosts and devices. Also referred to as a “switched fabric.” *See also* [cascade](#), [SAN](#), [topology](#).

Fabric Manager

An optionally licensed software. Fabric Manager is a GUI that allows for fabric-wide administration and management. Switches can be treated as groups, and actions such as firmware downloads can be performed simultaneously.

Fabric Mode

One of two possible modes for an L_Port, in which the L_Port is connected to another port that is not loop capable, using fabric protocol.

fabric name

The unique identifier assigned to a fabric and communicated during login and port discovery.

fabric port count

The number of ports available for connection by nodes in a fabric.

fabric services

Codes that describe the communication to and from any well-known address.

fabric topology

The arrangement of switches that form a fabric.

Fabric Watch

An optionally licensed software. Fabric Watch can be accessed through either the command line or Advanced Web Tools, and it provides the ability to set thresholds for monitoring fabric conditions.

failover

Describes the HP StorageWorks Core Switch 2/64 process of one CP passing active status to another CP. A failover is nondisruptive.

FAN

Fabric address notification. Retains the AL_PA and fabric address when a loop reinitializes, if the switch supports FAN.

fan-in

The ratio of hosts to storage devices; the view of the SAN from the storage port's perspective.

fan-out

The ratio of storage devices to hosts; the view of the SAN from the host port's perspective.

FC-0

Lowest layer of Fibre Channel transport. Represents physical media.

FC-1

Layer of Fibre Channel transport that contains the 8b/10b encoding scheme.

FC-2

Layer of Fibre Channel transport that handles framing and protocol, frame format, sequence exchange management, and ordered set usage.

FC-3

Layer of Fibre Channel transport that contains common services used by multiple N_Ports in a node.

FC-4

Layer of Fibre Channel transport that handles standards and profiles for mapping upper-level protocols such as SCSI and IP onto the Fibre Channel Protocol.

FC-AL-3

The Fibre Channel arbitrated loop standard defined by ANSI. Defined on top of the FC-PH standards.

FC-AV

Fibre Channel audio visual.

FCC

Federal Communications Commission.

FC-CT

Fibre Channel common transport.

FC-FG

Fibre Channel generic requirements.

FC-FLA

The Fibre Channel fabric loop-attach standard defined by ANSI.

FC-FS

Fibre Channel framing and signaling.

FC-GS

Fibre Channel generic services.

FC-GS-2

Fibre Channel generic services, second generation.

FC-GS-3

Fibre Channel Generic Services, third generation.

FC_IP

Fibre Channel-over-IP.

FC-PH

The Fibre Channel physical and signaling standard for FC-0, FC-1, and FC-2 layers of the Fibre Channel Protocol. Indicates signaling used for cable plants, media types, and transmission speeds.

FC-PH-2

Fibre Channel Physical Interface, second generation.

FC-PH-3

Fibre Channel Physical Interface, third generation.

FC-PI

Fibre Channel Physical Interface standard, defined by ANSI.

FC-PLDA

The Fibre Channel Private Loop Direct Attach standard defined by ANSI. Applies to the operation of peripheral devices on a private loop.

FC_SB

Fibre Channel single bytes.

FC_VI

Fibre Channel virtual interface.

FCA

Flow-control acknowledgement (DLSW).

FCIA

Fibre Channel Industry Association. An international organization of Fibre Channel industry professionals. Provides oversight of ANSI and industry-developed standards, among other tasks.

FCLC

Fibre Channel Loop Community.

FCP

Fibre Channel Protocol. Mapping of protocols onto the Fibre Channel standard protocols. For example, SCSI FCP maps SCSI-3 onto Fibre Channel.

FCS switch

Relates to the Secure Fabric OS feature. One or more designated switches that store and manage security parameters and configuration data for all switches in the fabric. They also act as a set of backup switches to the primary FCS switch. *See also* [bandwidth](#), [primary FCS switch](#).

FFFFF5

Well-known Fibre Channel address for a Class 6 multicast server.

FFFFF6

Well-known Fibre Channel address for a clock synchronization server.

FFFFF7

Well-known Fibre Channel address for a security key distribution server.

FFFFF8

Well-known Fibre Channel address for an alias server.

FFFFF9

Well-known Fibre Channel address for a QoS facilitator.

FFFFFA

Well-known Fibre Channel address for a management server.

FFFFFB

Well-known Fibre Channel address for a time server.

FFFFFC

Well-known Fibre Channel address for a directory server.

FFFFFD

Well-known Fibre Channel address for a fabric controller.

FFFFFE

Well-known Fibre Channel address for a fabric F_Port.

FFFFF

Well-known Fibre Channel address for a broadcast alias ID.

Fibre Channel

Fibre Channel is a protocol used to transmit data between servers, switches, and storage devices. It is a high-speed, serial, bidirectional, topology-independent, multiprotocol, and highly scalable interconnection between computers, peripherals, and networks.

Fibre Channel transport

A protocol service that supports communication between Fibre Channel service providers. *See also* [FSP](#).

FIFO

First in, first out. Refers to a data buffer that follows the first in, first out rule.

fill word

An IDLE or ARB ordered set that is transmitted during breaks between data frames to keep the Fibre Channel link active.

firmware

The basic operating system provided with the hardware.

FL_Port

Fabric loop port. A port that is able to transmit under fabric protocol and also has arbitrated loop capabilities. Can be used to connect an NL_Port to a switch. *See also* [F_Port](#), [Fx_Port](#).

flash

Programmable nonvolatile RAM (NVRAM) memory that maintains its contents without power.

FLOGI

Fabric login. The process by which an N_Port determines whether a fabric is present and, if so, exchanges service parameters with it. *See also* [PLOGI](#).

FOTP

Fiber Optic Test Procedure. Standards developed and published by the Electronic Industries Association (EIA) under the EIA-RS-455 series of standards.

FPD

Field-programmable device. Interchangeable with “PLD”.

FPGA

Field-programmable gate array. An FPD that allows high logic capacity.

frame

The Fibre Channel structure used to transmit data between ports. Consists of a start-of-frame delimiter, header, optional headers, data payload, cyclic redundancy check (CRC), and end-of-frame delimiter. There are two types of frames: link control frames (transmission acknowledgements and so forth) and data frames.

FRU

Field-replaceable unit. A component that can be replaced on-site.

FS

Fibre Channel service. A service that is defined by Fibre Channel standards and exists at a well-known address. For example, the Simple Name Server is a Fibre Channel service. *See also* [FSP](#).

FSP

Fibre Channel Service Protocol. The common protocol for all fabric services, transparent to the fabric type or topology. *See also* [FS](#).

FSPF

Fabric shortest path first. The routing protocol for Fibre Channel switches.

FSS

Fabric OS state synchronization. The FSS service is related to high availability (HA). The primary function of FSS is to deliver state update messages from active components to their peer standby components. FSS determines if fabric elements are synchronized (and thus FSS “compliant”).

FTP

File Transfer Protocol.

FTS

Fiber Transport Services.

full fabric

The software license that allows multiple E_Ports on a switch, making it possible to create multiple ISL links.

full fabric citizenship

A loop device that has an entry in the Simple Name Server.

full-duplex

A mode of communication that allows the same port to simultaneously transmit and receive frames. *See also* [half-duplex](#).

Fx_Port

A fabric port that can operate as either an F_Port or FL_Port. *See also* [F_Port](#), [FL_Port](#).

G_Port

Generic port. A port that can operate as either an E_Port or an F_Port. A port is defined as a G_Port when it is not yet connected or has not yet assumed a specific function in the fabric.

gateway

Hardware that connects incompatible networks by providing translation for both hardware and software. For example, an ATM gateway can be used to connect a Fibre Channel link to an ATM connection.

GBIC

Gigabit interface converter. A removable serial transceiver module that allows gigabaud physical-level transport for Fibre Channel and gigabit Ethernet.

Gb/sec

Gigabits per second (1,062,500,000 bits per second).

GB/sec

Gigabytes per second (1,062,500,000 bytes per second).

GUI

A graphic user interface, such as Advanced Web Tools and Fabric Manager.

HA

High availability. A set of features in HP StorageWorks switches that is designed to provide maximum reliability and nondisruptive replacement of key hardware and software modules.

half-duplex

A mode of communication that allows a port to either transmit or receive frames at any time except simultaneously (with the exception of link control frames, which can be transmitted at any time).
See also [full-duplex](#).

hard address

The AL_PA that an NL_Port attempts to acquire during loop initialization.

HBA

Host bus adapter. The interface card between a server or workstation bus and the Fibre Channel network.

header

A Fibre Channel frame has a header and a payload. The header contains control and addressing information associated with the frame.

host

A computer system that provides end users with services like computation and storage access.

hot-swappable

A hot-swappable component can be replaced under power.

HTTP

Hypertext Transfer Protocol. The standard TCP/IP transfer protocol used on the World Wide Web.

hub

A Fibre Channel wiring concentrator that collapses a loop topology into a physical star topology. Nodes are automatically added to the loop when active and removed when inactive.

HW

Hardware.

ID_ID

Insistent domain ID. A parameter of the `configure` command in the Fabric OS.

idle

Continuous transmission of an ordered set over a Fibre Channel link when no data is being transmitted, to keep the link active and maintain bit, byte, and word synchronization.

iFCP

Internet Fibre Channel Protocol. Supports Fibre Channel Layer 4 FCP-Over-TCP/IP. It is a gateway-to-gateway protocol in which TCP/IP switching and routing components enhance or replace Fibre Channel fabric.

in-band

Transmission of management protocol over the Fibre Channel.

Insistent Domain ID Mode

Sets the domain ID of a switch as insistent, so that it remains the same over reboots, power cycles, failovers, and fabric reconfigurations.

integrated fabric

The fabric created by a HP StorageWorks SAN Switch Integrated/64, consisting of six switches cabled together and configured to handle traffic as a seamless group.

interswitch link

See also [ISL](#).

intracabinet

A specification for copper cabling that allows up to a 13-meter (42-foot) distance within a single cabinet.

IOD

In-order delivery. A parameter that, when set, guarantees that frames are either delivered in order or dropped.

IP

Internet Protocol. The addressing part of TCP.

iSCSI

Internet Small Computer Systems Interface. A protocol that defines the processes for transferring block storage applications over TCP/IP networks by encapsulating SCSI commands into TCP and transporting them over the network via IP.

ISL

Interswitch link. A Fibre Channel link from the E_Port of one switch to the E_Port of another. *See also* [cascade](#), [E_Port](#).

ISL oversubscription ratio

The ratio of the number of free ports (non-ISL) to the number of ISLs on a switch.

isolated E_Port

An E_Port that is online but not operational due to overlapping domain IDs or nonidentical parameters (such as E_D_TOVs). *See also* [E_Port](#).

ISP

Internet service provider.

IU

Information unit. A set of information as defined by either an upper-level process protocol definition or upper-level protocol mapping.

JBOD

Just a bunch of disks. Indicates a number of disks connected in a single chassis to one or more controllers. *See also* [RAID](#).

key

A string of data (usually a numeric value) shared between two entities and used to control a cryptographic algorithm. Usually selected from a large pool of possible keys to make unauthorized identification of the key difficult. *See also* [key pair](#).

key pair

In public key cryptography, a pair of keys consisting of an entity's public and private key. The public key can be publicized, but the private key must be kept secret.

L_Port

Loop port. A node port (NL_Port) or fabric port (FL_Port) that has arbitrated-loop capabilities. An L_Port can be in either Fabric Mode or Loop Mode.

LAN

Local area network. A network in which transmissions typically take place over fewer than 5 kilometers (3.4 miles).

latency

The time required to transmit a frame. Together, latency and bandwidth define the speed and capacity of a link or system.

LED

Light-emitting diode. Used to indicate the status of elements on a switch.

Link Services

A protocol for link-related actions.

LM_TOV

Loop master timeout value. The minimum time that the loop master waits for a loop initialization sequence to return.

login server

The unit that responds to login requests.

loop circuit

A temporary bidirectional communication path established between L_Ports.

loop failure

Loss of signal within a loop for any period of time, or loss of synchronization for longer than the timeout value.

Loop_ID

A hexadecimal value representing one of the 127 possible AL_PA values in an arbitrated loop.

loop initialization

The logical procedure used by an L_Port to discover its environment. Can be used to assign AL_PA addresses, detect loop failure, or reset a node.

Loop Mode

One of two possible modes for an L_Port, in which the L_Port is in an arbitrated loop, using loop protocol. An L_Port in Loop Mode can also be in Participating Mode or Nonparticipating Mode.

looplet

A set of devices connected in a loop to a port that is a member of another loop.

LPB

Loop port bypass. A primitive sequence transmitted by an L_Port to bypass one or all L_Ports to which it is directed. It is used only in arbitrated loops.

LPE

Loop port enable. A primitive sequence transmitted by an L_Port to enable one or all L_Ports that have been bypassed with the LPB. It is used only in arbitrated loops.

LPSM

Loop Port State Machine. Logic that monitors and performs the tasks required for initialization and access to the loop. It is maintained by an L_Port to track behavior through different phases of loop operations. Alternatively, the logical entity that performs arbitrated loop protocols and defines the behavior of L_Ports when they require access to an arbitrated loop.

LR

Link reset. A primitive sequence used during link initialization between two N_Ports in point-to-point topology or an N_Port and an F_Port in fabric topology. The expected response is an LRR.

LRR

Link reset response. A primitive sequence during link initialization between two N_Ports in point-to-point topology or an N_Port and an F_Port in fabric topology. It is sent in response to an LR and expects a response of Idle.

LWL

Long wavelength. A type of fiber optic cabling that is based on 1300-nm lasers and supports link speeds of 1.0625 Gb/sec. Can also refer to the type of GBIC or SFP. *See also* [SWL](#).

MALLOC

Memory allocation. Usually relates to buffer credits.

MAN

Metropolitan area network.

MB/sec

Megabytes per second.

Mb/sec

Megabits per second.

metric

A relative value assigned to a route to aid in calculating the shortest path (1000 at 1 Gb/sec, 500 at 2 Gb/sec).

MIB

Management Information Base. An SNMP structure to help with device management, providing configuration and device information.

MMF

Multimode fiber. *See also* [SWL](#).

MS

Management Server. The Management Server allows a storage area network (SAN) management application to retrieve information and administer the fabric and interconnected elements, such as switches, servers, and storage devices. The MS is located at the Fibre Channel well-known address FFFFFFFAh.

MSD

Management Server daemon. Monitors the MS. Includes the Fabric Configuration Service and the Unzoned Name Server.

MTBF

Mean time between failures. An expression of time, indicating the longevity of a device.

multicast

The transmission of data from a single source to multiple specified N_Ports (as opposed to all the ports on the network).

multimode

A fiber optic cabling specification that allows up to 500 meters between devices.

N_Port

Node port. A port on a node that can connect to a Fibre Channel port or to another N_Port in a point-to-point connection. *See also* [NL_Port](#), [Nx_Port](#).

Name Server

Simple Name Server (SNS). A switch service that stores names, addresses, and attributes for up to 15 minutes and provides them as required to other devices in the fabric. SNS is defined by Fibre Channel standards and exists at a well-known address. Also referred to as “directory service.”

NAS

Network-attached storage. A disk array connected to a controller that gives access via a LAN.

NDMP

Network Data Management Protocol. Used for tape backup without using server resources.

NL_Port

Node loop port. A node port that has arbitrated-loop capabilities. Used to connect an equipment port to the fabric in a loop configuration through an FL_Port. *See also* [N_Port](#), [Nx_Port](#).

node

A Fibre Channel device that contains an N_Port or NL_Port.

node count

The number of nodes attached to a fabric.

node name

The unique identifier for a node, communicated during login and port discovery.

Non-participating Mode

A mode in which an L_Port in a loop is inactive and cannot arbitrate or send frames but can retransmit received transmissions. This mode is entered if there are more than 127 devices in a loop and an AL_PA cannot be acquired. *See also* [L_Port](#).

NOS

Not operational. The NOS primitive sequence is transmitted to indicate that the FC_Port transmitting the NOS has detected a link failure or is offline, waiting for the offline sequence (OLS) to be received.

NSCAM

Name Server Cache Manager. Updates the Name Server (NS) databases across switches as a background task.

Nx_Port

A node port that can operate as either an N_Port or NL_Port.

OLS

Primitive sequence offline.

OPN

Open primitive signal. Applies only to arbitrated loop; sent by an L_Port that has won the arbitration process to open communication with one or more ports on the loop.

ordered set

A transmission word that uses 8b/10b mapping and begins with the K28.5 character. Ordered sets occur outside of frames and include the following items:

- **Frame delimiters.** Mark frame boundaries and describe frame contents.
- **Primitive signals.** Indicate events.

■ **Primitive sequences.** Indicate or initiate port states.

Ordered sets are used to differentiate Fibre Channel control information from data frames and to manage frame transport.

originator

The Nx_Port that originated an exchange.

out-of-band

Transmission of management protocol outside of the Fibre Channel network, usually over Ethernet.

oversubscription

A situation in which more nodes could potentially contend for a resource than the resource could simultaneously support (typically an ISL). Oversubscription could be a desirable attribute in fabric topology, as long as it does not produce unacceptable levels of congestion.

packet

A set of information transmitted across a network. *See also* [frame](#).

PAL

Programmable Array Logic. A relatively small FPD.

parallel

The simultaneous transmission of data bits over multiple lines.

payload

A Fibre Channel frame has a header and a payload. The payload contains the information being transported by the frame; it is determined by the higher-level service or FC_4 upper-level protocol. There are many different payload formats, based on protocol.

Performance Monitoring

A switch feature that monitors port traffic and includes frame counters, SCSI read monitors, SCSI write monitors, and other types of monitors.

persistent error log

Error messages of a high enough level (by default, Panic or Critical) are saved to flash memory on the switch instead of to RAM. These messages are saved over reboots and power cycles, constituting the persistent error log. Note that each CP on a HP StorageWorks Core Switch 2/64 has its own unique persistent error log.

phantom address

An AL_PA value that is assigned to a device that is not physically in the loop. Also known as “phantom AL_PA.”

phantom device

A device that is not physically in an arbitrated loop but is logically included through the use of a phantom address.

PID

Port identifier. *See also* [core PID](#).

PKI

Public key infrastructure. An infrastructure that is based on public key cryptography and CA (certificate authority) and that uses digital certificates. *See also* [CA](#), [digital certificate](#).

PKI certification utility

Public key infrastructure certification utility. A utility that makes it possible to collect certificate requests from switches and to load certificates to switches. *See also* [digital certificate](#), [PKI](#).

PLOGI

Port login. The port-to-port login process by which initiators establish sessions with targets. *See also* [FLOGI](#).

point-to-point

A Fibre Channel topology that employs direct links between each pair of communicating entities. *See also* [topology](#).

port

In an HP StorageWorks switch environment, an SFP or GBIC receptacle on a switch to which an optic cable for another device is attached.

port address

In Fibre Channel technology, the port address is defined in hexadecimal. In the Fabric OS, a port address can be defined by a domain and port number combination or by area number. In an ESCON Director, an address used to specify port connectivity parameters and to assign link addresses for attached channels and control units.

port cage

The metal casing extending out of the optical port on the switch, into which the SFP can be inserted.

port card

A hardware component that provides a platform for field-replaceable, hot-swappable ports.

port log

A record of all activity on a switch, kept in volatile memory.

port log dump

A view of what happens on a switch, from the switch's point of view. The `portlogdump` command is used to read the port log.

port name

A user-defined alphanumeric name for a port.

port swapping

The ability to redirect a failed port to another port. This feature is available in Fabric OS V4.1.0 and later.

port_name

The unique identifier assigned to a Fibre Channel port. Communicated during login and port discovery.

POST

Power-on self-test. A series of tests run by a switch after it is turned on.

PPP

Point-to-Point Protocol.

primary FCS switch

Relates to the Secure Fabric OS feature. The primary fabric configuration server switch actively manages security and configurations for all switches in the fabric. *See also* [bandwidth](#), [FCS switch](#).

primitive sequence

An ordered set that is transmitted repeatedly and continuously. Primitive sequences are transmitted to indicate specific conditions within or conditions encountered by the receiver logic of an FC_Port. *See also* [OLS](#), [NOS](#).

primitive signals

An ordered set that indicates actions or events and requires just one occurrence to trigger a response. Idle and R_RDY are used in all three topologies: ARB, OPN, and CLS. MRK is used in arbitrated loop.

principal switch

The first switch to boot up in a fabric. Ensures unique domain IDs among roles.

private device

A device that supports arbitrated loop protocol and can interpret 8-bit addresses but cannot log in to the fabric.

private key

The secret half of a key pair. *See also* [key](#), [key pair](#).

private loop

An arbitrated loop that does not include a participating FL_Port.

private loop device

A device that supports a loop and can understand 8-bit addresses but does not log in to the fabric.

private NL_Port

An NL_Port that communicates only with other private NL_Ports in the same loop and does not log in to the fabric.

protocol

A defined method and set of standards for communication. Determines the type of error-checking, the data-compression method, how sending devices indicate an end of message, and how receiving devices indicate receipt of a message.

pstate

Port State Machine.

PSU

Power supply unit.

public device

A device that supports arbitrated-loop protocol, can interpret 8-bit addresses, and can log in to the fabric.

public loop

An arbitrated-loop that includes a participating FL_Port and can contain both public and private NL_Ports.

public NL_Port

An NL_Port that logs in to the fabric, can function within either a public or a private loop, and can communicate with either private or public NL_Ports.

quad

A group of four adjacent ports that share a common pool of frame buffers.

queue

A mechanism for each AL_PA address that allows for collecting frames prior to sending them to the loop.

R_A_TOV

Resource allocation timeout value. The maximum time a frame can be delayed in the fabric and still be delivered. *See also* [E_D_TOV](#), [RR_TOV](#).

R_CTL

Route control. The first 8 bits of the header, which defines the type of frame and its contents.

R_RDY

Receiver ready. A primitive signal indicating that the port is ready to receive a frame.

R_T_TOV

Receiver transmitter timeout value, used by receiver logic to detect loss of synchronization between transmitters and receivers.

radius

The greatest “distance” between any edge switch and the center of a fabric. A low-radius network is better than a high-radius network.

RAID

Redundant array of independent disks. A collection of disk drives that appear as a single volume to the server and are fault tolerant through mirroring or parity checking. *See also* [JBOD](#).

RAIT

Redundant array of independent tapes.

RCS

Reliable Commit Service. Refers to ILS command code.

RCS_SFC

RCS Stage Fabric Config. Refers to ILS command code.

receiver

A device that performs detection and signal processing.

redundancy

Having multiple occurrences of a component to maintain high availability (HA).

remote switch

An optional product for long-distance fabrics, requiring a Fibre Channel-to-ATM or SONET gateway.

request rate

The rate at which requests arrive at a servicing entity.

resilience

A fabric's ability to adapt to or tolerate a failure of a component within the fabric.

resilient core/edge topology

Two or more switches acting as a core to interconnect multiple edge switches. Nodes attach to the edge switches.

responder

The N_Port with which an exchange originator wants to communicate.

return loss

The ratio (expressed in dB) of incident power to reflected power, when a component or assembly is introduced into a link or system. Can refer to optical power or to electrical power in a specified frequency range.

RLS

Read Link Status.

route

As it applies to a fabric, the communication path between two switches. Might also apply to the specific path taken by an individual frame, from source to destination. *See also* [FSPF](#).

routing

The assignment of frames to specific switch ports, according to frame destination.

RR_TOV

Resource recovery timeout value. The minimum time a target device in a loop waits after a LIP before logging out an SCSI initiator. *See also* [E_D_TOV](#), [R_A_TOV](#).

RSCN

Registered state change notification. A switch function that allows notification of fabric changes to be sent from the switch to specified nodes. The fabric controller issues RSCN requests to N_Ports and NL_Ports, but only if they have registered to be notified of state changes in other N_Ports and NL_Ports. This registration is performed via the State Change Registration (SCR) Extended Link Service. An N_Port or NL_Port can issue an RSCN to the fabric controller without having completed SCR with the fabric controller.

running disparity

A binary parameter indicating the cumulative disparity (positive or negative) of all previously issued transmission characters.

RW

Read/write. Refers to access rights.

RX

Receiving frames.

RX_ID

Responder exchange identifier. A 2-byte field in the frame header that can be used by the responder of the exchange to identify frames as being part of a particular exchange.

S_ID

Source ID. Refers to the native port address (24 bit address).

SAN

Storage area network. A network of systems and storage devices that communicate using Fibre Channel protocols. *See also* [fabric](#).

SAN architecture

The overall design of a storage network solution, which includes one or more related fabrics, each of which has a topology.

SAN port count

The number of ports available for connection by nodes in the entire SAN.

scalability

One of the properties of a SAN: the size to which a SAN topology can grow port and switch counts with ease.

SCN

State change notification. Used for internal state change notifications, not external changes. This is the switch logging that the port is online or is an Fx_Port, not what is sent from the switch to the Nx_Ports.

SCR

State change registration. Extended Link Service (ELS) requests the fabric controller to add the N_Port or NL_Port to the list of N_Ports and NL_Ports registered to receive the Registered State Change Notification (RSCN) Extended Link Service.

SCSI

Small Computer Systems Interface. A parallel bus architecture and a protocol for transmitting large data blocks to a distance of 15 to 25 meters.

SCSI-2

An updated version of the SCSI bus architecture.

SCSI-3

An SCSI standard that defines transmission of SCSI protocol data over different kinds of links.

SDRAM

The main memory for a switch.

sectelnet

A protocol similar to Telnet but with encrypted passwords for increased security.

Secure Fabric OS

A separately sold feature that provides advanced, centralized security for a fabric.

security policy

Rules that determine how security is implemented in a fabric. Security policies can be customized through Secure Fabric OS or Fabric Manager.

SEQ_ID

Sequence identifier. A 1-byte field in the frame header change to identify the frames as being part of a particular exchange sequence between a pair of ports.

sequence

A group of related frames transmitted in the same direction between two N_Ports.

sequence initiator

The N_Port that begins a new sequence and transmits frames to another N_Port.

sequence recipient

Serializing-deserializing circuitry. A circuit that converts a serial bit stream into parallel characters, and vice-versa.

serial

The transmission of data bits in sequential order over a single line.

server

A computer that processes end-user applications or requests.

service rate

The rate at which an entity can service requests. *See also* [request rate](#).

SFF

Small-form-factor. An industry term for a smaller transceiver. *See also* [SFP](#).

SFP

Small-form-factor pluggable. A transceiver used on 2 GB/sec switches that replaces the GBIC.

SFP cable

A cable specifically designed for use with an SFP. Not compatible with GBICs.

SI

Sequence initiative.

Simple Name Server (SNS)

A switch service that stores names, addresses, and attributes for up to 15 minutes and provides them as required to other devices in the fabric. SNS is defined by Fibre Channel standards and exists at a well-known address. Also referred to as “directory service” or “Name Server.”

Single CP Mode

The `-s` option of the `firmwaredownload` command. Using `firmwaredownload -s` enables Single CP Mode. In the Core Switch 2/64, Single CP Mode enables a user to upgrade a single CP and to select full-install, autoreboot, and autocommit.

Single Mode

The fiber-optic cabling standard for devices up to 10 kilometers apart.

S-Link Service

Facilities used between an N_Port and the fabric, or between two N_Ports, for login, sequence exchange management, and maintaining connections.

SMF

Single-mode fiber. *See also* [LWL](#).

SMI

Structure of management information. A notation for setting or retrieving SNMP management variables.

SNMP

Simple Network Management Protocol. An Internet management protocol that uses either IP for network-level functions and UDP for transport-level functions, or TCP/IP for both. Can be made available over other protocols, such as UDP/IP, because it does not rely on the underlying communication protocols. *See also* [community \(SNMP\)](#).

SNS

Simple Name Server.

SOF

Start of frame. A group of ordered sets that marks the beginning of a frame and indicates the class of service the frame will use.

soft zone

A zone consisting of zone members that are made visible to each other through client service requests. Typically, soft zones contain zone members that are visible to devices using Name Server exposure of zone members. The fabric does not enforce a soft zone. Note that well-known addresses are implicitly included in every zone.

SoIP

SCSI-over-IP.

SONET

Synchronous optical network. A standard for optical networks that provides building blocks and flexible payload mappings.

special character

A 10-bit character that does not have a corresponding 8-bit value but is still considered valid. The special character is used to indicate that a particular transmission word is an ordered set. This is the only type of character to have five 1s or 0s in a row.

SPLD

Simple PLD. Usually, either a PLA or PAL.

SPOF

Single point of failure. Any component in a SAN whose malfunction could bring down the entire SAN.

SQ_ID

Sequence ID. Used to identify and track all of the frames within a sequence between a source (S_ID) and destination (D_ID) port pair.

SRM

Storage resource management. The management of disk volumes and file resources.

SSH

Secure shell. Used starting in Fabric OS V4.1 to support encrypted Telnet sessions to the switch. SSH encrypts all messages, including the client sending the password at login.

Standard Translative Mode

Allows public devices to communicate with private devices that are directly connected to the fabric.

storage

A device used to store data, such as a disk or tape.

switch

A fabric device providing bandwidth and high-speed routing of data via link-level addressing.

switch name

The arbitrary name assigned to a switch.

switch port

A port on a switch. Switch ports can be E_Ports, F_Ports, or FL_Ports.

switch-to-switch authentication

The process of authenticating both switches in a switch-to-switch connection using digital certificates. *See also* [authentication](#), [digital certificate](#).

SWL

Short wavelength. A type of fiber-optic cabling that is based on 850 nm lasers and supports 1.0625 GB/sec. link speeds. Can also refer to the type of GBIC or SFP. *See also* [LWL](#).

syslog

Syslog daemon. Used to forward error messages.

T10

A standards committee chartered with creating standards for SCSI.

T11

A standards committee chartered with creating standards for Fibre Channel.

target

A storage device on a Fibre Channel network.

TCP/IP

Transmission Control Protocol / Internet Protocol.

Telnet

A virtual terminal emulation used with TCP/IP. “Telnet” is sometimes used as a synonym for the Fabric OS CLI.

throughput

The rate of data flow achieved within a cable, link, or system. Usually measured in bps (bits per second, or b/sec). *See also* [bandwidth](#).

tiering

The process of grouping particular SAN devices by function and then attaching these devices to particular switches or groups of switches based on that function.

Time Server

A Fibre Channel service that allows for the management of all timers.

topology

As it applies to Fibre Channel technology, the configuration of the Fibre Channel network and the resulting communication paths allowed. There are three possible topologies:

- **Point to point.** A direct link between two communication ports.
- **Switched fabric.** Multiple N_Ports linked to a switch by F_Ports.
- **Arbitrated loop.** Multiple NL_Ports connected in a loop.

TPC

Third-party copy. A protocol for performing tape backups without using server resources.

transceiver

A device that converts one form of signaling to another for transmission and reception; in fiber optics, optical to electrical.

Translative Mode

A mode in which private devices can communicate with public devices across the fabric.

trap (SNMP)

The message sent by an SNMP agent to inform the SNMP management station of a critical error.
See also [SNMP](#).

trunking

In Fibre Channel technology, a feature that enables distribution of traffic over the combined bandwidth of up to four ISLs between adjacent switches, while preserving in-order delivery.

trunking group

A set of up to four trunked ISLs.

trunking ports

The ports in a set of trunked ISLs.

TS

Time Server.

U_Port

Universal port. A switch port that can operate as a G_Port, E_Port, F_Port, or FL_Port. A port is defined as a U_Port when it is not connected or has not yet assumed a specific function in the fabric.

ULP

Upper-level protocol. The protocol that runs on top of Fibre Channel. Typical upper-level protocols are SCSI, IP, HIPPI, and IPI.

ULP_TOV

Upper-level timeout value. The minimum time that an SCSI ULP process waits for SCSI status before initiating ULP recovery.

WAN

Wide area network.

watchdog

A software daemon that monitors Fabric OS modules on the kernel.

WDM

Wavelength division multiplexer. Allows multiple wavelengths to be combined or filtered on a single cable.

well-known address

As it pertains to Fibre Channel technology, a logical address defined by Fibre Channel standards as assigned to a specific function and stored on the switch.

workstation

A computer used to access and manage the fabric. Also referred to as a “management station” or “host.”

WWN

World Wide Name. An identifier that is unique worldwide. Each entity in a fabric has a separate WWN.

zone

A set of devices and hosts attached to the same fabric and configured as being in the same zone. Devices and hosts within the same zone have access to others in the zone but are not visible to any outside the zone.

zone configuration

A specified set of zones. Enabling a configuration enables all zones in that configuration. *See also* [defined zone configuration](#), [enabled zone configuration](#).

zoning

A feature in fabric switches or hubs that allows segmentation of a node by physical port, name, or address.

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